



OM-186 603

January 1998

Processes



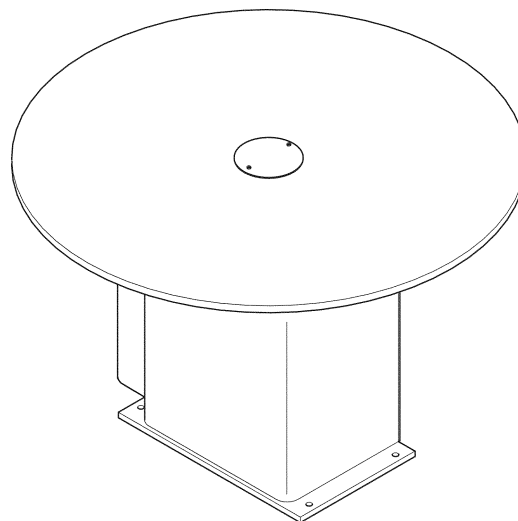
Automatic Welding

Description



Indexing Turntable

T60 Indexing Turntable



Visit our website at
www.MillerWelds.com

OWNER'S MANUAL

From Miller to You

Thank you and congratulations on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've



Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001 Quality System Standard.

made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide which exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual catalog sheets. To locate your nearest distributor call 1-800-4-A-Miller.



Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.



Miller offers a Technical Manual which provides more detailed service and parts information for your unit. To obtain a Technical Manual, contact your local distributor. Your distributor can also supply you with Welding Process Manuals such as SMAW, GTAW, GMAW, and GMAW-P.



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SECTION 1 - SAFETY PRECAUTIONS - READ BEFORE USING

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1-1. Symbol Usage



Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ Marks a special safety message.

☞ Means "Note"; not safety related.



This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Arc Welding Hazards

▲ The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-4. Read and follow all Safety Standards.

▲ Only qualified persons should install, operate, maintain, and repair this unit.

▲ During operation, keep everybody, especially children, away.



ELECTRIC SHOCK can kill.

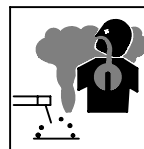
Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.

- If earth grounding of the workpiece is required, ground it directly with a separate cable – do not use work clamp or work cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

SIGNIFICANT DC VOLTAGE exists after removal of input power on inverters.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.



FUMES AND GASES can be hazardous.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



ARC RAYS can burn eyes and skin.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

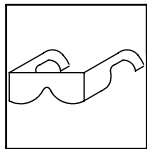
- Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather and wool) and foot protection.



WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.



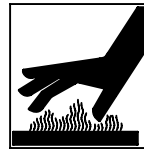
FLYING METAL can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.



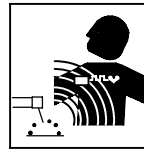
BUILDUP OF GAS can injure or kill.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



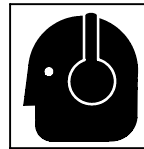
HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on gun or torch.



MAGNETIC FIELDS can affect pacemakers.

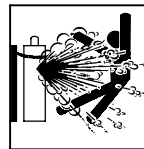
- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.



NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.



CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

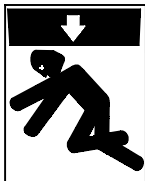
- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

1-3. Additional Symbols For Installation, Operation, And Maintenance



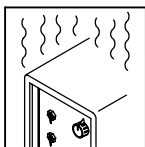
FIRE OR EXPLOSION hazard.

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.



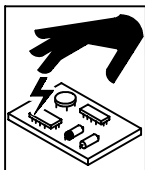
FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



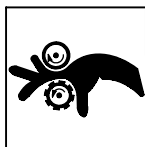
OVERUSE can cause OVERHEATING

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



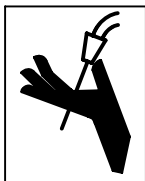
STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



MOVING PARTS can cause injury.

- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.



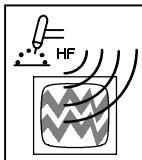
WELDING WIRE can cause injury.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.



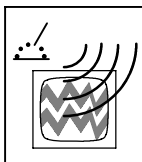
MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

1-4. Principal Safety Standards

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting And Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

1-5. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: "The body of evidence, in the committee's judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard." However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

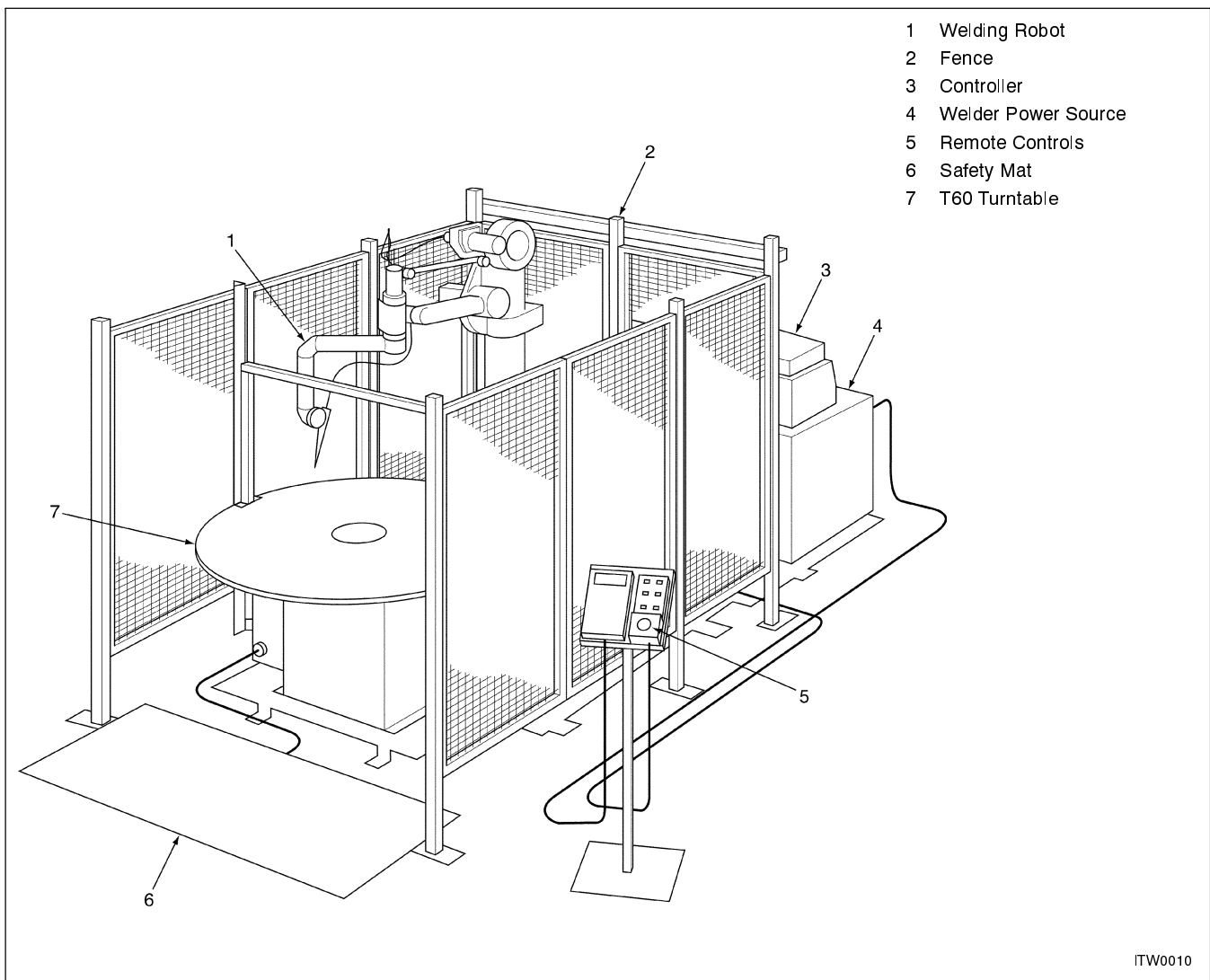
Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 - SPECIFICATIONS

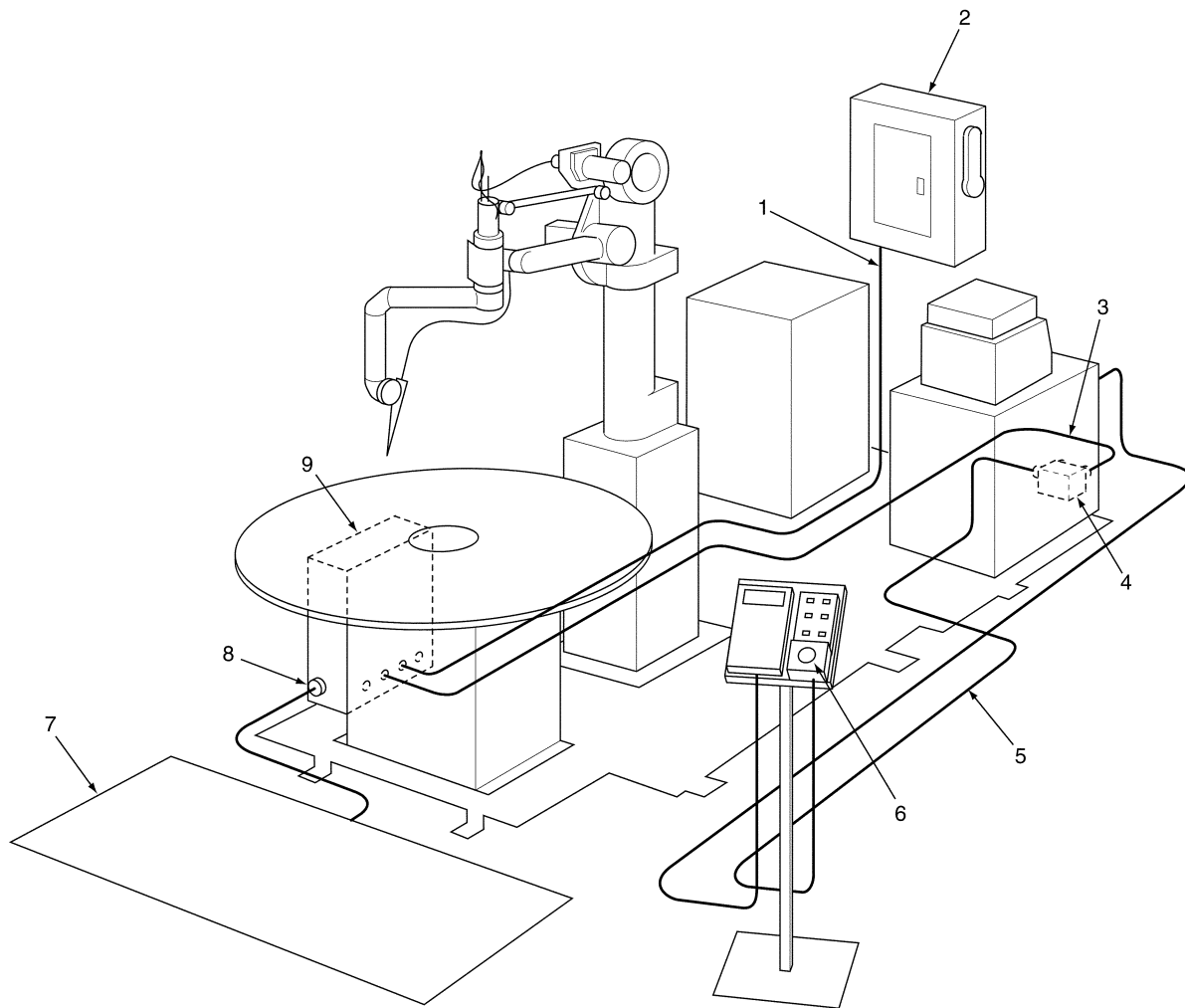
Specification	Description
Overall Dimensions	Height: 30 in (762 mm), Turntable Top Diameter: 60 in (1525 mm)
Base Dimensions	Width: 18-3/4 in (476.25 mm), Length: 30 in (762 mm)
Weight	Net: 1578 lb (716 kg); Ship 2,200 lb (998 kg)
Customer Supplied Disconnect	600 Volts, 30 Amps, 3 Phase, Fused Disconnect
Input Voltage	460 VAC, 3 Phase
Motor	3 HP, 460 VAC, 3 Phase, 1725 RPM
Turntable Oscillation	180 Degrees Clockwise, then 180 Degrees Counterclockwise
Gear Reduction	100:1

SECTION 3 - INSTALLATION

3-1. Typical Installation



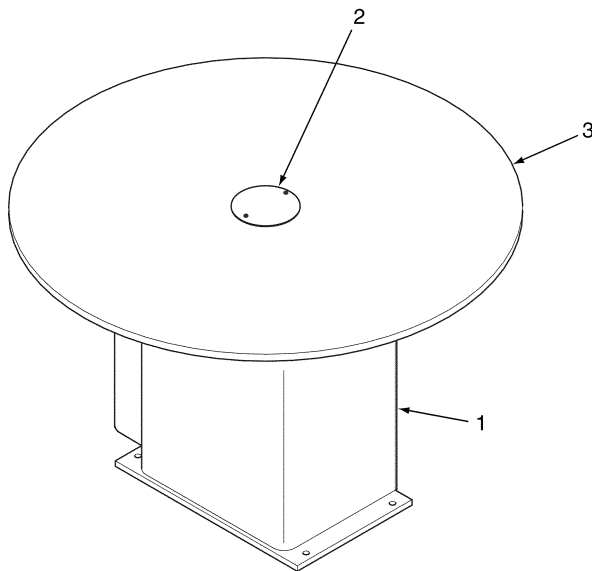
3-2. Typical Connections



ITW0009

- | | | |
|--------------------------------------------------------------------------------------|--------------------------|--------------------------|
| 1 T60 Power Cable | 3 Input/output Cable | 7 Safety Mat |
| 2 600 Volt, 30 Amp, 3-Phase Power Supply with 5 Amp Fused Disconnect (User-Provided) | 4 Junction Box | 8 Safety Mat Connection |
| | 5 Reset Switch Cable | 9 Electronic Control Box |
| | 6 Turntable Reset Switch | |

3-3. Lifting T60 Turntable



- 1 Turntable Base
- 2 Access Cover
- 3 Turntable Top

The turntable may be lifted many ways, listed below in order of preference.

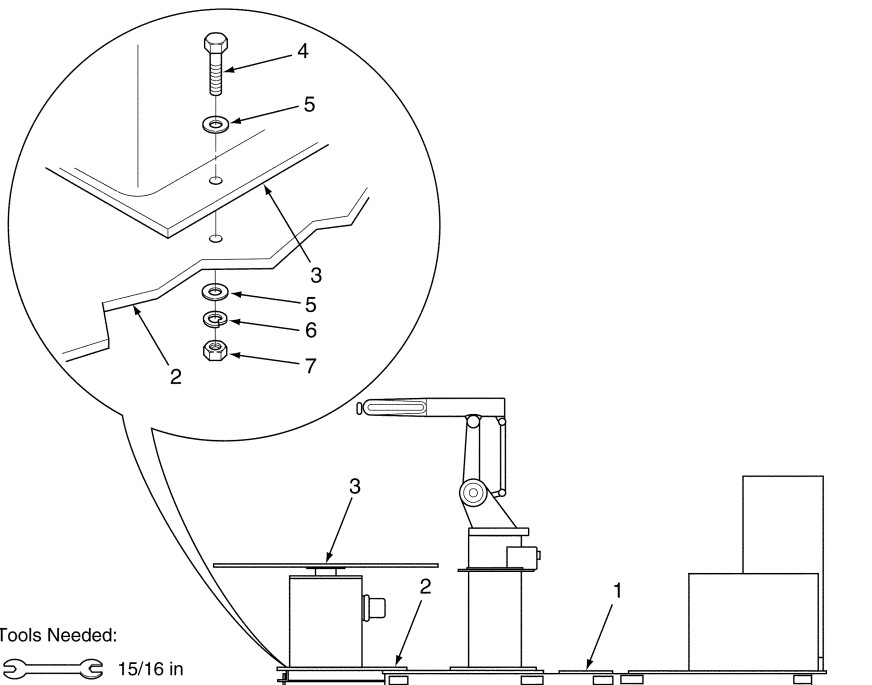
- a. Lift under the turntable base using a forklift.
- b. Remove the access cover from the turntable top. Install lifting eyes in mounting holes. Lift using a lifting device (such as lifting straps or chains) rated with minimum lifting capacity of 2,000 lb (907.2 kg), attached to the lifting eyes.
- c. Lift under the turntable top using a forklift.
- d. Lift using a lifting device (such as lifting straps or chains) rated with minimum lifting capacity of 2,000 lb (907.2 kg), attached to the turntable top.

ITW0020

3-4. Mounting T60 Turntable



See manual for docking station base and satellite station base for installation and leveling instructions.



Tools Needed:
 15/16 in

- 1 Docking Station Base
- 2 Satellite Station Base
- 3 T60 Turntable

Docking station base and satellite station base must be properly installed and leveled before installing turntable.



Position T60 turntable on satellite station base and align mounting holes.

- 4 5/8-11 x 2 Grade 8 Bolt
- 5 5/8 Washer
- 6 5/8 Lock Washer
- 7 5/8-11 Grade 8 Nut

Secure T60 turntable to satellite station base using 5/8-11 bolts, washers, lock washers, and nuts. Tighten nuts to 220 lb/ft (298 N•m).

ITW0011

3-5. Grounding Procedure

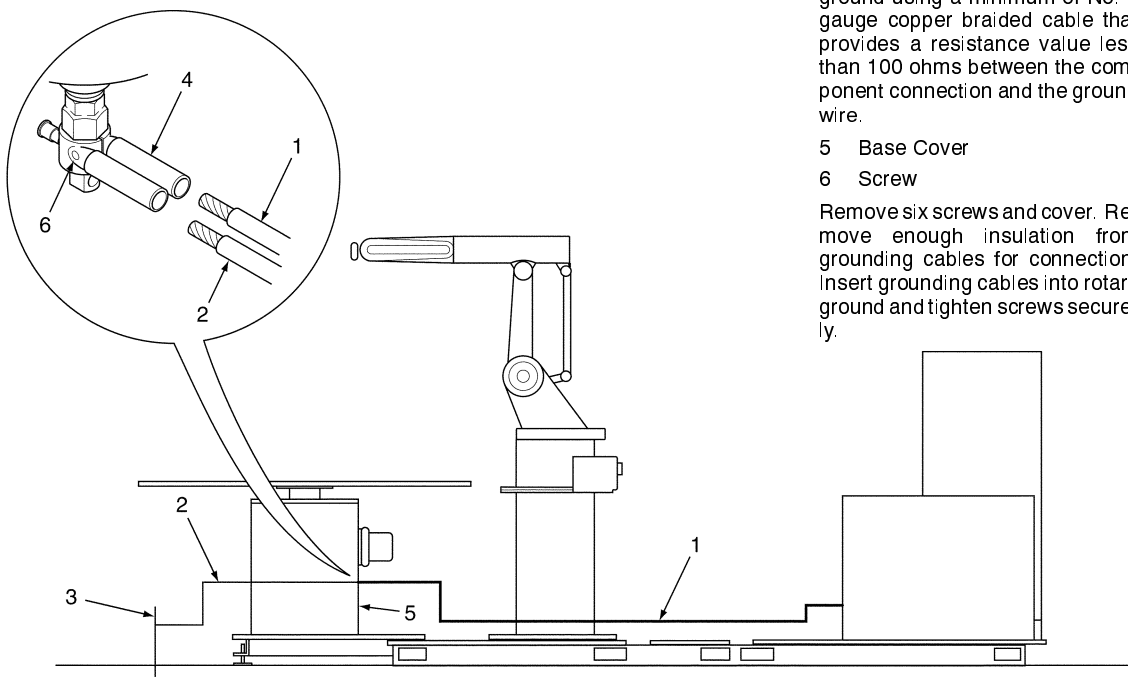



- 1 Work Weld Cable
- 2 Ground Cable
- 3 Ground Rod
- 4 Rotary Ground Connection


Make separate equipment earth ground using a minimum of No. 3 gauge copper braided cable that provides a resistance value less than 100 ohms between the component connection and the ground wire.

- 5 Base Cover
- 6 Screw

Remove six screws and cover. Remove enough insulation from grounding cables for connection. Insert grounding cables into rotary ground and tighten screws securely.




Tools Needed:



ITW0012


3-6. Connecting T60 Turntable to Input Power



WARNING

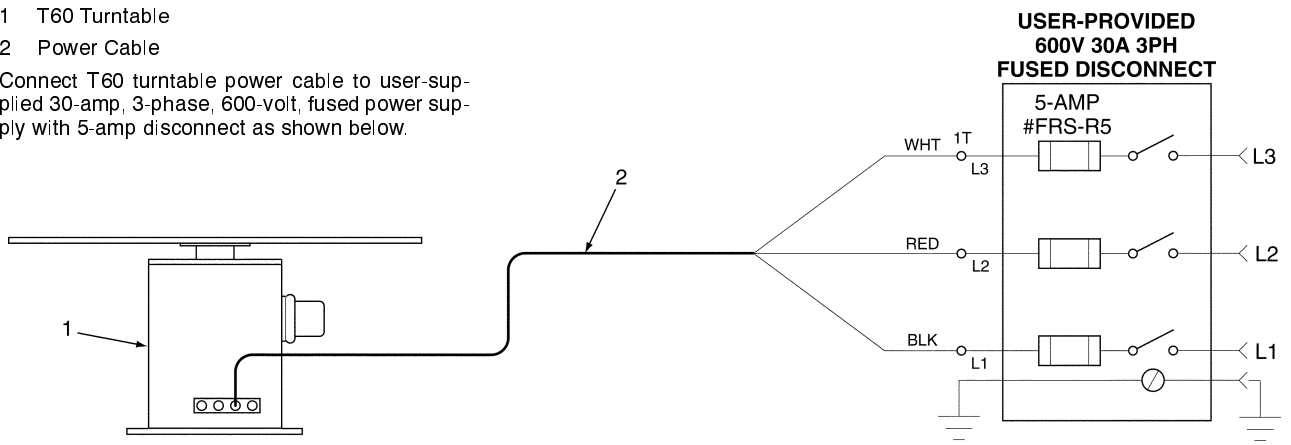
ELECTRICAL SHOCK can kill.

- Do not touch live electrical parts.
- Disconnect input power before inspecting or installing.
- Have only qualified persons install unit.
- Installation must meet National Electrical Code and all other codes.



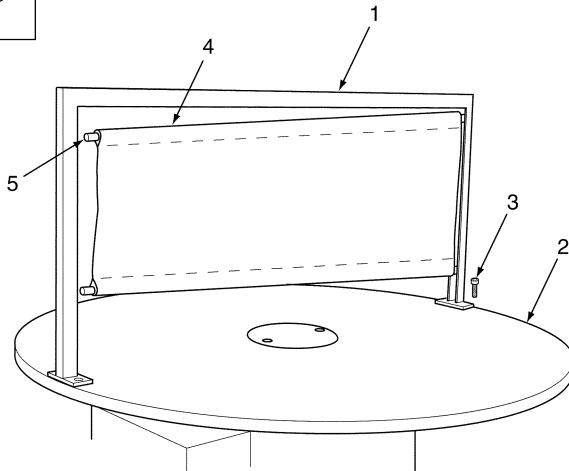
- 1 T60 Turntable
- 2 Power Cable

Connect T60 turntable power cable to user-supplied 30-amp, 3-phase, 600-volt, fused power supply with 5-amp disconnect as shown below.

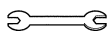


ITW0013

3-7. Installing Weld Curtain



Tools Needed:

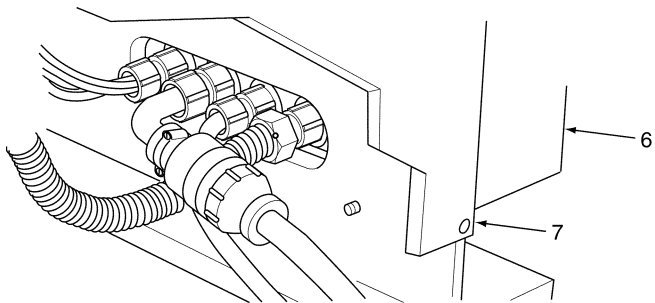


- 1 Weld Curtain Frame
- 2 Turntable Top
- 3 Capscrews
- 4 Weld Curtain
- 5 Support Bars

Install weld curtain frame on turntable top with four capscrews. Position weld curtain in curtain frame and install support bar through frame and curtain.

ITW0022

3-8. Installing Input/Output Cable To Robot



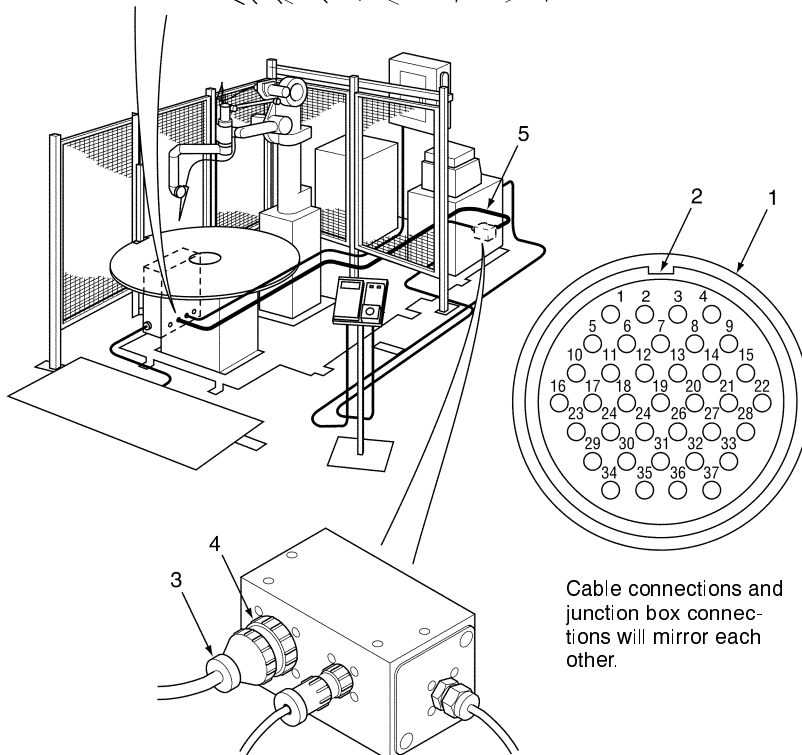
Use receptacle to connect input/output cable to robot.

- 1 Receptacle RC1
- 2 Keyway
- 3 Plug
- 4 Threaded Connector

To connect input/output cable to robot, align keyway, insert plug, and tighten threaded collar.

- 5 Input/output Cable
- 6 Electronic Control Box
- 7 Base Cover

Input/output cable comes connected to T60 turntable. It may be replaced by disconnecting cable at electronic control box after removing base cover.



Cable connections and junction box connections will mirror each other.

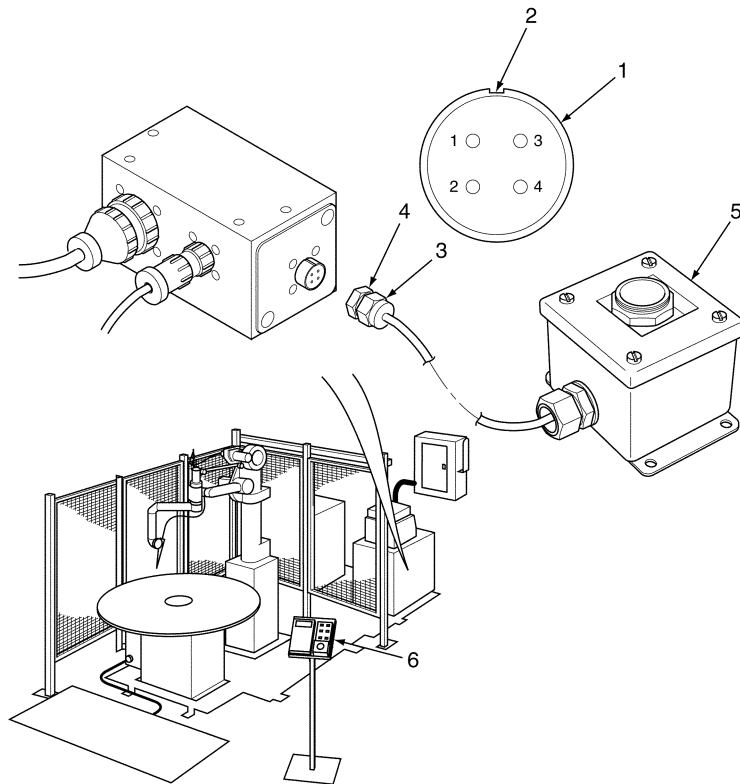
Socket Information:

- 1 E-stop to robot
- 2 E-stop to robot
- 3 Signal common to robot
- 4 Rotate complete to robot
- 5 Position left (A) to robot
- 6 Position right (B) to robot
- 7 Rotate command from robot
- 8 Rotate common from robot
- 9 E-stop from robot
- 10 E-stop from robot
- 11 Auto mode from robot
- 12 Teach mode from robot
- 13 Reset button to electronic control box
- 14 Reset button to electronic control box
- 15 Output command from robot

The remaining sockets are not used.

ITW0023

3-9. Installing Reset Button and Cable



Use receptacle to connect remote reset button to robot.

- 1 Receptacle
- 2 Keyway
- 3 Plug
- 4 Threaded Connector

To connect input/output cable to robot, align keyway, insert plug, and tighten threaded collar.

- 5 Remote Reset Button
- 6 Robot Pendant Stand

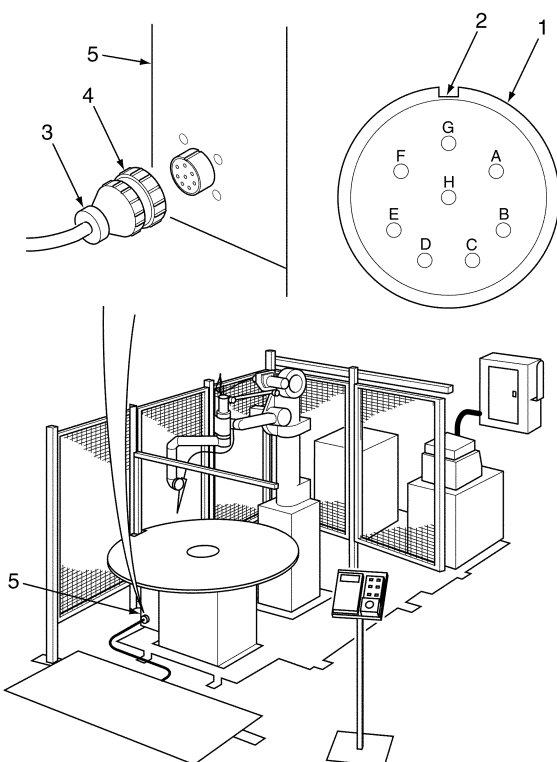
Attach remote reset button to robot pendant stand.

Socket Information:

- 1 Normally open contact with socket 2 closes when green reset button is pressed
- 2 Common
- 3 Ground
- 4 Not Used

ITW0019

3-10. Installing Safety Mat to Electronic Control Box



Use receptacle to connect remote reset button to robot.

- 1 Receptacle
- 2 Keyway
- 3 Plug
- 4 Threaded Connector
- 5 Electronic Control Box








To connect safety mat to Electronic Control Box, align keyway, insert plug, and tighten threaded collar.

Socket Information:

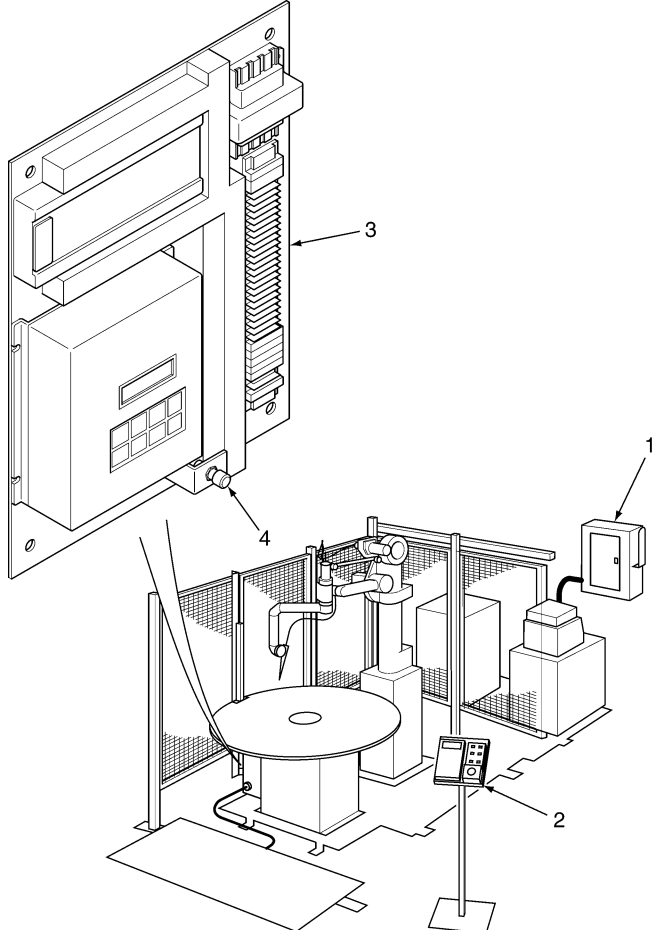
- A Not Used
- B Not Used
- C Not Used
- D Not Used
- E Normally open safety mat connection
- F Normally open safety mat connection
- G Normally open safety mat connection
- H Normally open safety mat connection

ITW0021

SECTION 4 - OPERATION

 WARNING	
	ELECTRICAL SHOCK can kill. <ul style="list-style-type: none"> Always wear dry insulating gloves. Insulate yourself from work and ground. Do not touch live electrical parts. Keep all panels and covers securely in place.
	FUSES AND GASES can be hazardous to your health. <ul style="list-style-type: none"> Keep your head out of the fumes. Ventilate area, or use breathing device. Read Material Safety Data Sheets (MSDSs) and manufacturer's instructions for material used.
	WELDING can cause fire or explosion. <ul style="list-style-type: none"> Do not weld near flammable material. Watch for fire; keep extinguisher nearby. Do not locate unit over combustible surfaces. Do not weld on closed containers. Allow work and equipment to cool before handling.
	ARC RAYS can burn eyes and skin; NOISE can damage hearing. <ul style="list-style-type: none"> Wear welding helmet with correct shade of filter. Wear correct eye, ear, and body protection.
	MOVING PARTS can cause injury. <ul style="list-style-type: none"> Keep away from moving parts. Keep all doors, panels, covers, and guards closed and securely in place.
	MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation. <ul style="list-style-type: none"> Pacemaker wearers keep away. Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.
See Safety Precautions at beginning of manual for basic welding safety information.	

4-1. Initial Turntable Power-up (if table is not on either hard stop)



1 600 Vac Disconnect

Turn turntable 600 Vac disconnect on. Refer to robot manual. Turn robot controller on. Wait for robot READY. Pull up robot E-stop. Reset robot. Turn servo on.

2 Turntable reset switch

Push turntable reset switch. Allocate robot program P901. Put robot in Auto mode.

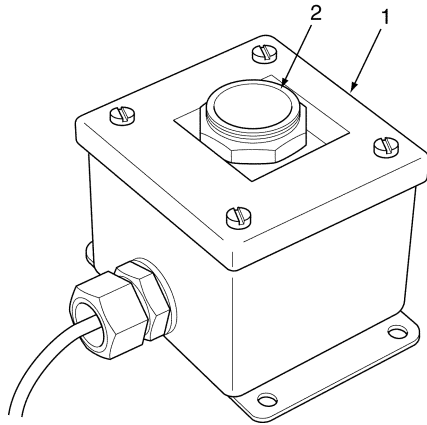
3 PLC Control Panel

4 Proximity Override Switch SW2

Open turntable electronic control box cover and hold down proximity override switch SW2 (red push button). Press START. When turntable moves, release switch SW2.

ITW0017

4-2. Turntable Reset Box



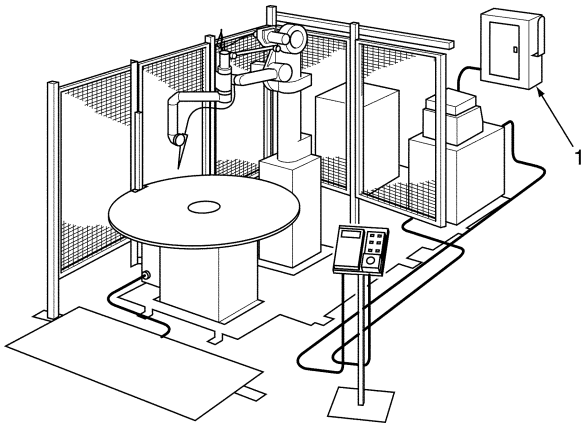
- 1 Turntable Reset Box
- 2 Turntable Reset Button SW1

The turntable reset button SW1 will clear any turntable faults and allow the turntable to rotate. The button should be depressed at the start of every day after system is powered up.

If the table stops rotating due to an E-stop and is not in position, reset the E-stop, then depress the turntable reset button SW1.

ITW0014

4-3. Turntable Drive Fault Recovery (if the turntable locks up)

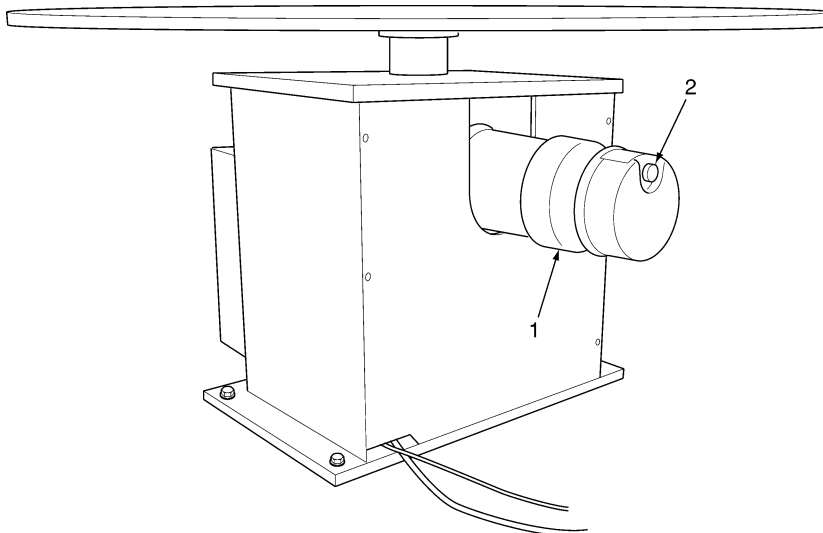


- 1 600 Vac Disconnect

Depress the E-stop button. Turn off the turntable 600 Vac input power and wait for at least 30 seconds. Turn on the turntable 600 Vac input power. Reset the E-stop.

ITW0015

4-4. Turntable Motor Brake



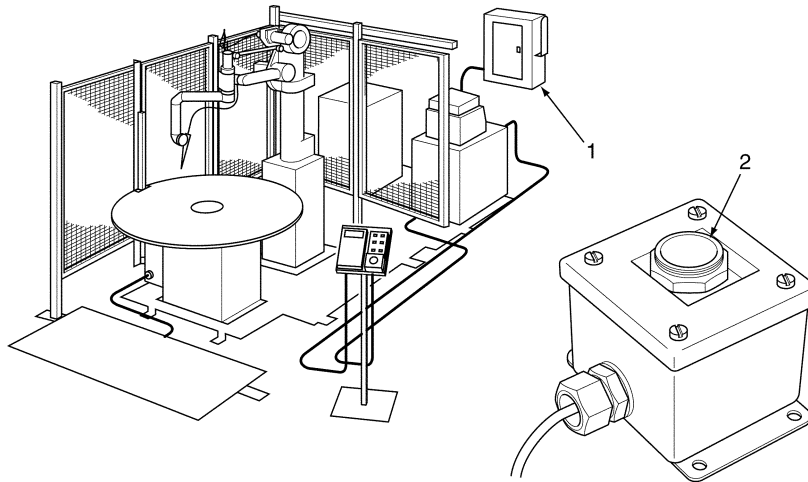
The turntable is held in position by a mechanical brake. If the turntable needs to be manually rotated, the brake can be released by rotating the release knob, which is located on the end of the electric motor housing.

- 1 Motor Brake
- 2 Motor Brake Release Knob

Depress the robot E-stop. Rotate the knob toward "RELEASE" to disengage the brake. Manually rotate the turntable into position. Rotate the motor release brake knob in the opposite direction to engage the brake.

ITW0016

4-5. Robot E-stop Recovery

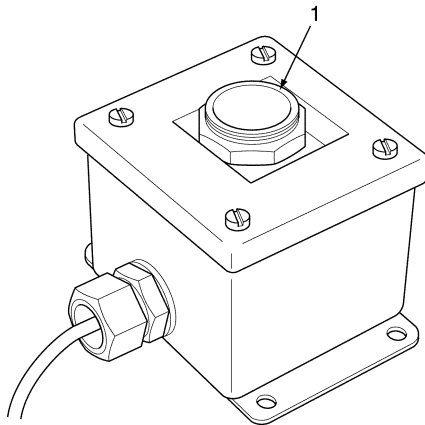


- 1 600 Vac Disconnect
- 2 Turntable Reset Button

Turn off the 600 Vac input power and wait at least 30 seconds. Reset robot (see robot manual). Turn servo on. Press turntable reset button. Put robot into auto mode (see robot manual). Start system.

ITW0024





4-6. Safety Mat Recovery



- 1 Turntable Reset Button
- Press turntable reset button.


ITW0032

SECTION 5 - MAINTENANCE & TROUBLESHOOTING

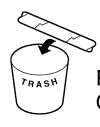
<div>  WARNING </div>			
	ELECTRICAL SHOCK can kill. <ul style="list-style-type: none"> Do not touch live electrical parts. Turn Off welding power source and control unit, and disconnect input power before inspecting, maintaining, or servicing. 		HOT PARTS can cause severe burns. <ul style="list-style-type: none"> Allow cooling period before maintaining or servicing.
			MOVING PARTS can cause injury. <ul style="list-style-type: none"> Keep away from moving parts.
		Maintenance to be performed only by qualified persons.	

5-1. Periodic Maintenance

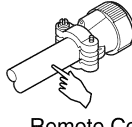
▲ Turn Off all power before maintaining.



3 Months

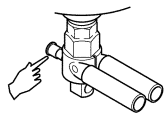


Replace Cracked Parts

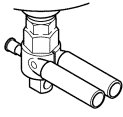


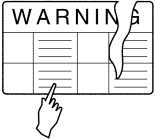
Remote Cords

Check/Add Rotary Ground Lubricant (See 5-14)




Adjust Rotary Ground And Cables (See 5-14)



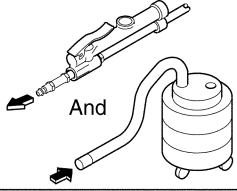


WARNING

Replace Unreadable Labels

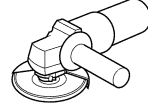


6 Months




And

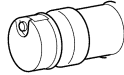
Blow Out Unit And Vacuum Inside Brake Assembly, Fan Housing



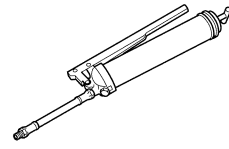
Grind Any Excess Weld Spatter Off Turntable Top



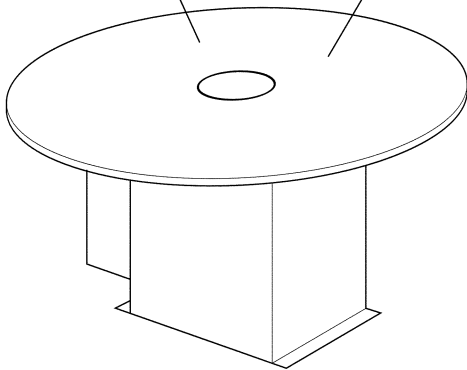
Wipe Turntable Top With WD-40 Or Equivalent



Check Motor Brake Adjustment (See 5-6)

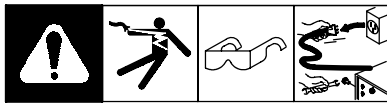


Lubricate Turntable Shaft Bearing (See 5-2)

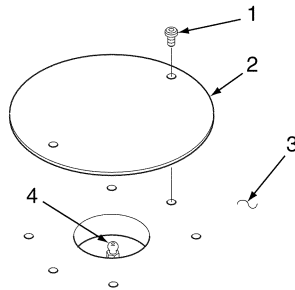


ITW0037

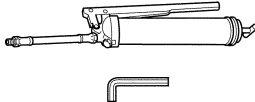
5-2. Lubricate Turntable Shaft Bearing



▲ Disconnect power before maintaining.



Tools Needed:



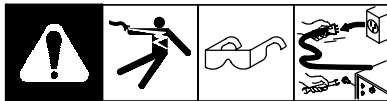
Turn off welder power supply and control unit, and disconnect turntable input power.

- 1 Button Head Capscrew
- 2 Turntable Cover
- 3 Turntable Top
- 4 Grease Fitting

Remove two button head capscrews and turntable cover from turntable top. Using a grease gun, apply 2-3 pumps of grease to grease fitting. Install turntable cover and two button head capscrews.

ITW0038

5-3. Gearbox Lubricant Change



▲ Disconnect power before maintaining.



Recycle fluids.

☞ The gearbox is filled with synthetic oil and should not require lubricant changes at regular intervals.

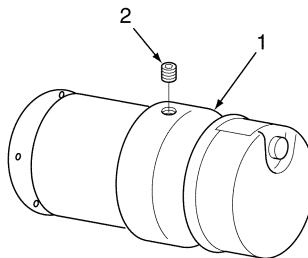
Turn off welder power supply and control unit, and disconnect turntable input power.

- 1 Gearbox
- 2 Plug

Remove gearbox (see 5.8). Remove plug from gearbox and drain oil into a container with a minimum capacity of 3 quarts.

The gearbox holds 2.6 quarts (2.5 liters) of synthetic oil. Fill gearbox to capacity and install gearbox (see 5.8).

☞ It is important that the same oil is used as is already in the gearbox. If an oil other than Shell Tivela SD is to be used, the gear box should be drained, then flushed with the oil to be used. Fill to correct quantity.



Tools Needed:

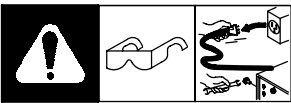


Approved Synthetic Oils (Polyglycol-based)		Ambient Temperature Range	
LUBRICANT SUPPLIER	LUBRICANT NAME	-22° F TO 86° F	68° F TO 122° F
David Brown	David Brown	6G	8G
Applied Chemicals Ltd.	Tribol 800	320 (-13)	680 (-13)
BP Oil Ltd.	Energyn SG-XP	-	680 (-18)
Esso Petroleum/Exxon	Glycolube	320 (-13)	-
Int. Specialty Chemical	Breox Ind Lub Sw	320 (-13)	-
Kluber Lubrication	Klubersynth GH6	320 (-13)	680 (-4)
Koolex International Inc.	Q8 Grade	320 (-8)	-
Shell Oils	Tivela	SC (-13)	-

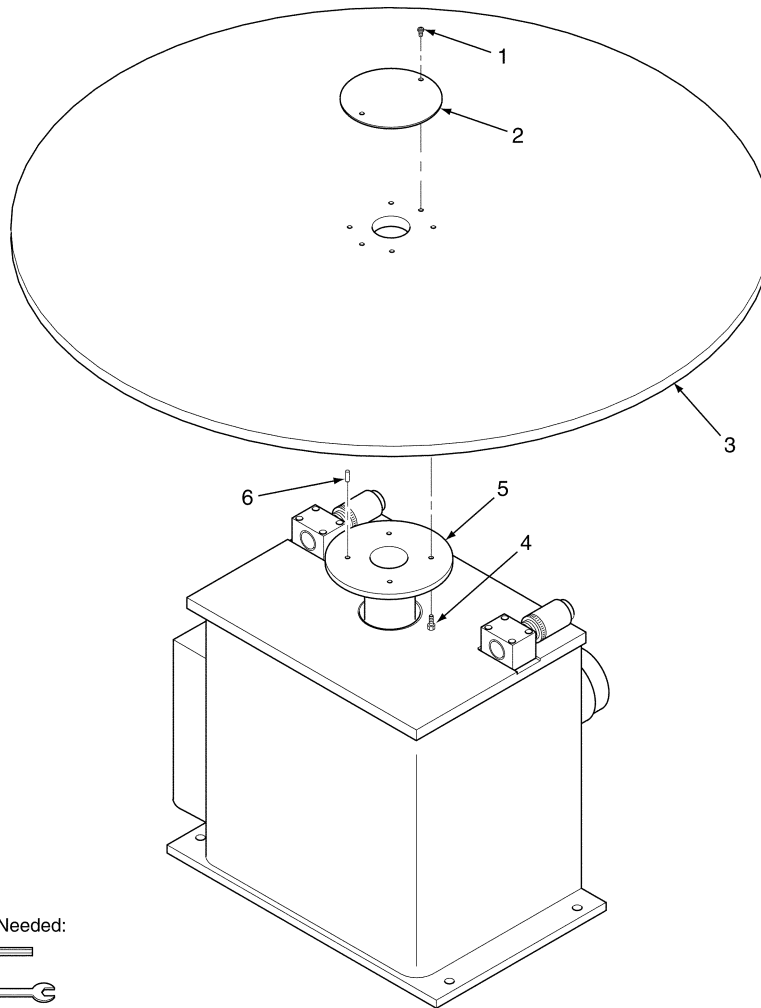
DANGER Number in brackets indicate recommended MINIMUM operating temperture in °F. THE UNIT MUST NOT RUN BELOW THIS TEMPERATURE.

itw0039

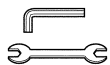
5-4. Turntable Top Replacement



▲ Disconnect power before maintaining.



Tools Needed:



Turn off welder power supply and control unit, and disconnect turntable input power.

- 1 Button Head Capscrews
- 2 Table Cover
- 3 Turntable Top

Remove two button head capscrews and table cover from turntable top. Attach a lifting device with minimum capacity of 863 lb (392 kg) to turntable top.

- 4 Hex Head Capscrews
- 5 Shaft Assembly

Use lifting device to support top while removing six hex head capscrews. Lift turntable top from shaft assembly. Keep top in level position while lifting.

- 6 Roll Pins

If damaged, remove two roll pins from shaft assembly.

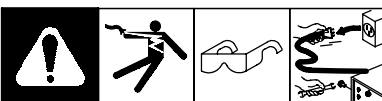
If removed, install two roll pins in shaft assembly. Attach a lifting device with minimum capacity of 863 lb (392 kg) to turntable top.

Keep top in level position while lifting. Lift and lower turntable top to shaft assembly.

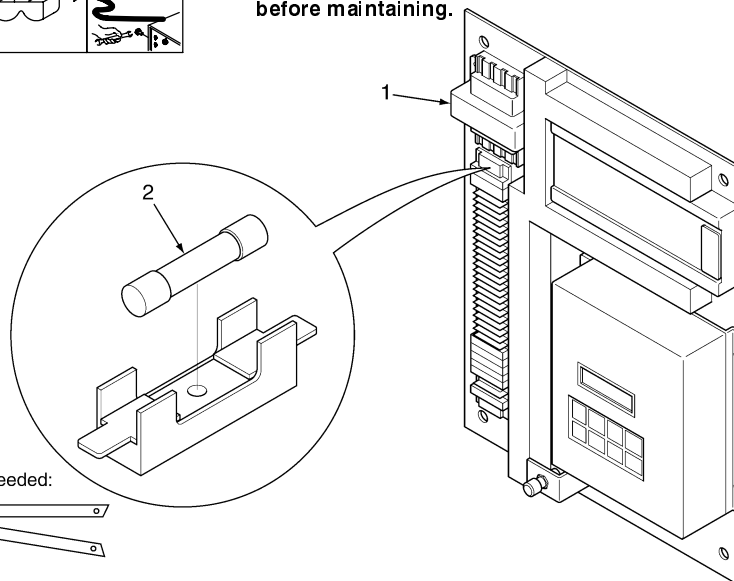
Align small holes in top with roll pins and lower top until resting on shaft assembly. Align holes and install six hex head capscrews in shaft assembly and turntable top. Tighten screws in crisscross pattern. Remove lifting device. Install cover and two button head capscrews.

ITW0028

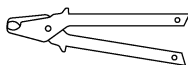
5-5. Overload Protection



▲ Disconnect power before maintaining.



Tools Needed:



Turn off welder power supply and control unit, and disconnect turntable input power.

Open electronic control box cover.

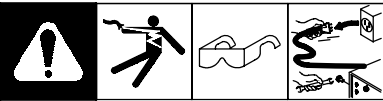
- 1 PLC Control Panel
- 2 1-amp Fuse

The fuse protects the circuitry from overload. If the fuse shuts down, the control unit shuts down.

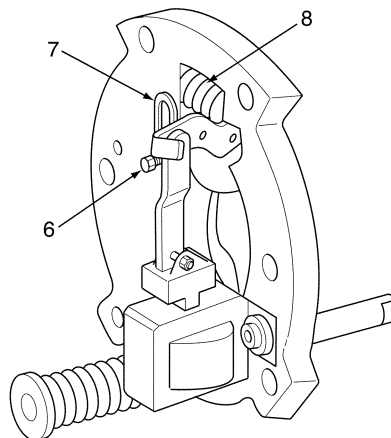
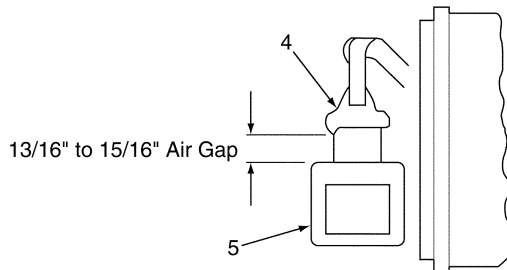
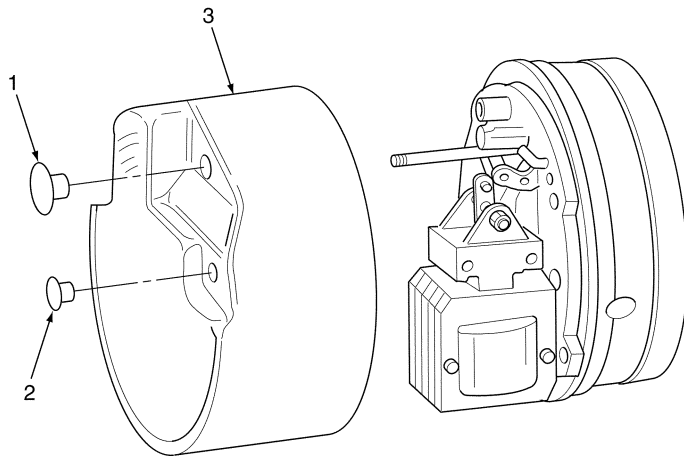
Check fuse and replace if necessary. Replace with 1-amp, #FNM-1 only. Use proper tool when replacing fuse. Close cover.

ITW0027

5-6. Electric Motor Brake Adjustment



▲ Disconnect power before maintaining.



NOTE The electric motor is self-adjusting and should require little maintenance. The solenoid air gap is factory-set and should not require routine checking. In the event of trouble, air gap should be checked.

After usage, the brake interior will contain burnt and degraded friction material dust, which must be removed prior to servicing or adjusting the brake.

DO NOT BLOW OFF DUST. Use a vacuum cleaner or a soft brush. Do not allow dust to become airborne.

Turn off welder power supply and control unit, and disconnect turntable input power.

- 1 Manual Release Knob
- 2 Housing Nuts
- 3 Housing
- 4 Plunger
- 5 Solenoid Frame

Remove manual release knob, housing nuts, and housing. Measure distance between plunger and solenoid frame. Normal gap is 13/16" to 15/16".

- 6 Stop Screws
- 7 Wrap Spring Stop

To adjust, loosen stop screws and slightly raise or lower wrap spring stop. Tighten stop screws. Lift plunger to maximum travel and release. Depress plunger to maximum travel and release, allowing it to snap up. Repeat several times, then recheck air gap.

- 8 Wrap Spring

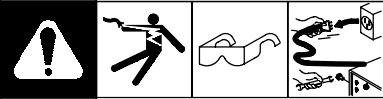
Tang of wrap spring must be below, and make contact with, wrap spring stop when solenoid lever is manually raised. If not, rebend to square position, and reset air gap.

Should air gap disappear due to overheating, oil may have been applied. Remove and clean parts with solvent which does not leave a film.

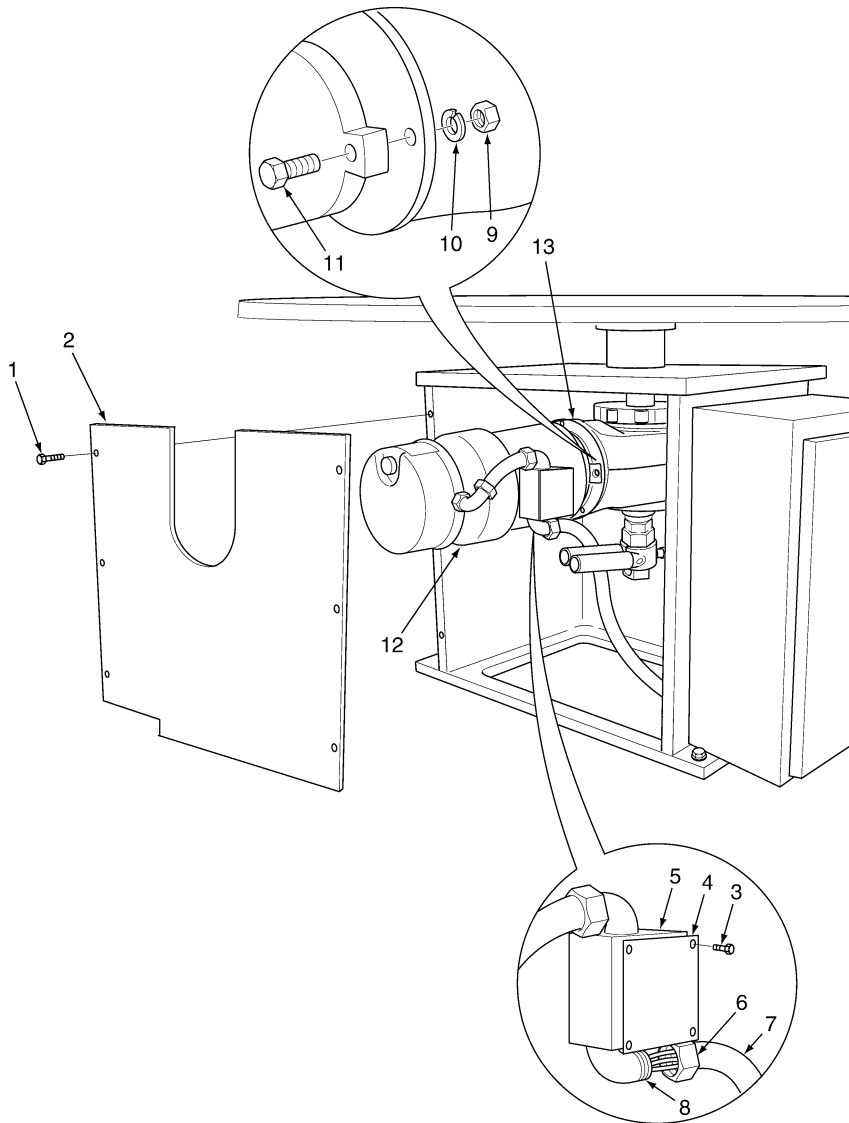
Install housing with housing nuts, and install manual release knob.

ITW0025

5-7. Electric Motor Replacement



▲ Disconnect power before maintaining.



Turn off welder power supply and control unit, and disconnect turntable input power.

- 1 Screws
- 2 Base Cover
- 3 Screw
- 4 Junction Box Cover

Remove two screws and junction box cover from motor junction box.

Remove six screws and base cover.

- 5 Motor Junction Box
- 6 Nut
- 7 Conduit
- 8 Fitting

Remove two screws and junction box cover from motor junction box.

Locate, tag, and record positions of four wires leading to electronic control box (see NO TAG). Loosen four screws and remove the four wires. Loosen nut, and pull wires and conduit from fitting. Install nut on fitting.

- 9 Nut
- 10 Lockwashers
- 11 Capscrew
- 12 Electric motor
- 13 Gearbox

Remove four nuts, lockwashers, and capscrews. Slide electric motor from gearbox.

To install electric motor to gearbox. Align shaft with hole in C-flange in gearbox. Slide motor forward until mounting surfaces mate. Align holes and install four capscrews, lockwashers and capscrews.

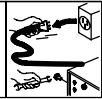
Loosen nut, and feed wires and conduit through nut and into fitting. Install nut on fitting. Tighten nut. Install wires in junction box (see NO TAG) and tighten screws.

Install junction box cover on motor junction box with two screws.

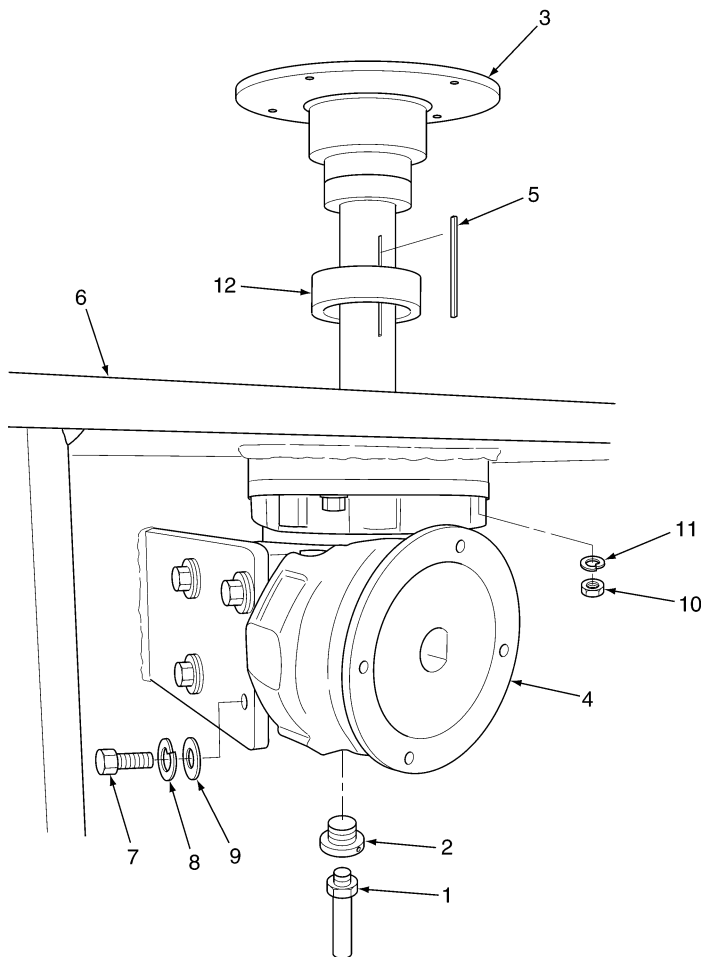
Install base cover with six screws.

ITW0040

5-8. Gearbox and Shaft Replacement



▲ Disconnect power before maintaining.



Turn off welder power supply and control unit, and disconnect turntable input power.

Remove turntable top (see 5-4), electric motor (see 5-7), and rotary ground (see 5-14).

- 1 Grounding Nut
- 2 Collar
- 3 Shaft

Remove grounding nut and collar from shaft.

- 4 Gearbox
- 5 Key
- 6 Base
- 7 Capscrew
- 8 Lockwasher
- 9 Washer
- 10 Hex Nut
- 11 Lockwasher

Pull shaft free of gearbox and remove key. Support gearbox and remove four screws, lockwashers, and washers from side support. Remove Four nuts and lockwashers, then lower the gearbox from the base.

- 12 Bushing

Using a puller, remove bushing from base.

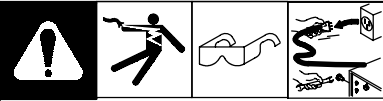
Install new bushing in base, by placing a block of wood over positioned bearing and tapping it in place with a hammer. Install four capscrews in mounting holes in top of base. Raise gearbox and guide capscrews through mounting holes. Install four lockwashers and nuts, snug but do not tighten yet. Install four screws, washers, and nuts through side support, snug but do not tighten yet. Tighten top nuts, then tighten side mounting nuts.

Position key in shaft. Align key with keyway inside gearbox. Slide shaft into gearbox until shoulder rests on bushing. Install collar into bottom of shaft. Install grounding nut into collar.

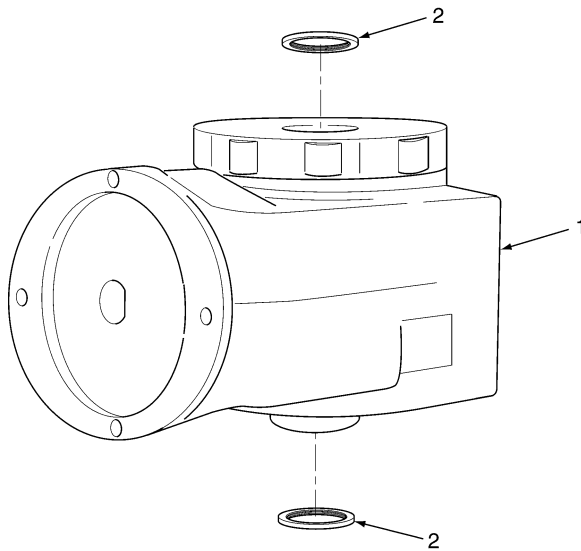
Install rotary ground (see 5-14), electric motor (see 5-7), and turntable top (see 5-4).

ITW0026

5-9. Gearbox Oil Seal Replacement



▲ Disconnect power before maintaining.



Turn off welder power supply and control unit, and disconnect turntable input power.

Remove gearbox from base assembly (5-8).

Clean and drain gearbox.

Remove screws and cover.

1 Gearbox

2 Oil Seal

Note: Take care not to damage the shims and do not alter the shaft position. Check for burrs or scratches to the shaft which could damage the new seal. Remove seals from input and output sides of gearbox. Tap the old seal out of the housing or cover using an appropriate sized drift. Ensure the mating surfaces and shims are clean and position the shims in the cover. Coat mating surfaces of cover and case with a good sealing compound. Replace cover and tighten screws. Wipe seals with oil used in gearbox. Position seal on seal guide, slide it along shaft, and press seal into housing or cover. Fill with correct amount of lubricant (see 5-3).

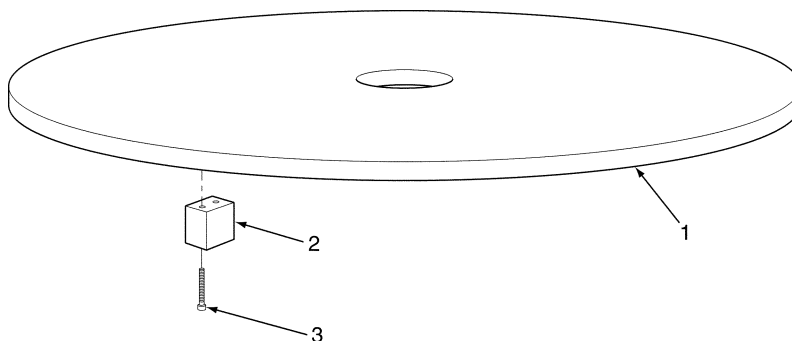
Install gearbox assembly in base.

ITW0035

5-10. Stop Block Replacement



▲ Disconnect power before maintaining.



The stop block will not wear out. If damage occurs, it may be replaced.

Turn off welding power supply and control unit, and disconnect input power.

1 Turntable Top

2 Stop Block

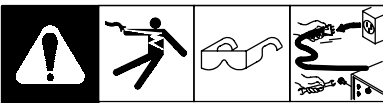
3 Socket Head Capscrew

Remove turntable top (see 5-4). Remove four socket head capscrews and stop block from turntable top.

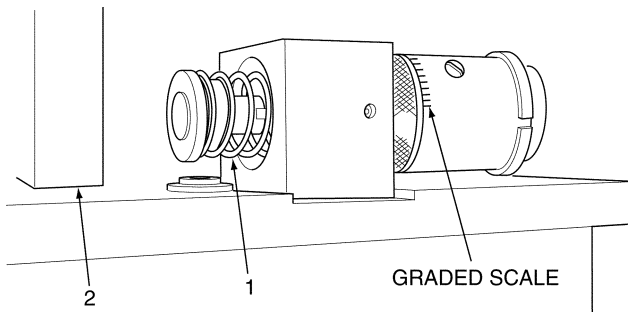
Install stop block on turntable top with four socket head capscrews. Install turntable top (see 5-4).

ITW0036

5-11. Shock Absorber Adjustment



▲ Disconnect power before maintaining.



Shock absorbers are present at factory. If turntable begins to stop hard, adjustment may be changed.

Turn off welding power supply and control unit, and disconnect input power.

1. Shock Absorber

2. Stop Block

To adjust shock absorbers, the turntable top must first be positioned with the stop block positioned between the two shocks, not resting on either.

To adjust shock absorbers, turn adjuster left or right to reach to desired adjustment.

Standard settings are as follows:

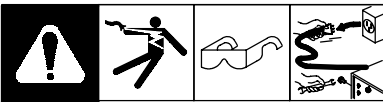
Electronic control box side is set at 2 on graded scale.

Other side is set to 1 1/2 on graded scale.

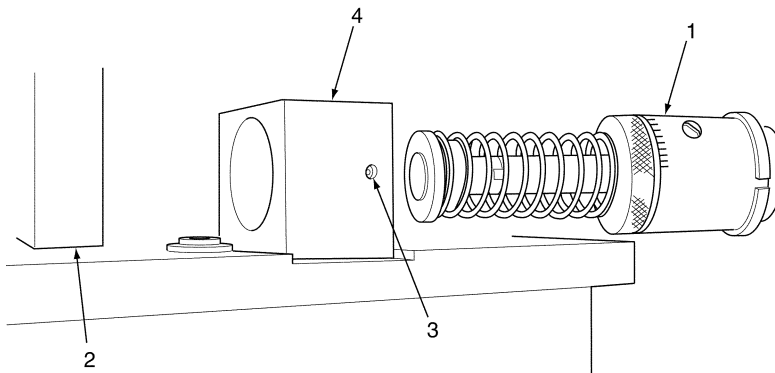
See initial turntable power-up (4-1) before restarting system.

ITW0033

5-12. Shock Absorber Replacement



▲ Disconnect power before maintaining.



Shock absorbers may be adjusted. However, if damage occurs, replacement will be required.

Turn off welding power supply and control unit, and disconnect input power.

1. Shock Absorber

2. Stop Block

To replace shock absorbers, the turntable top must first be positioned with the stop block positioned between the two shocks, not resting on either.

3. Nylon Setscrew

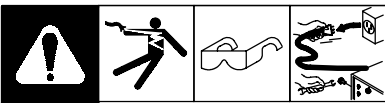
4. Shock mount

Loosen nylon setscrew, and unscrew the shock absorbers from the shock mounts.

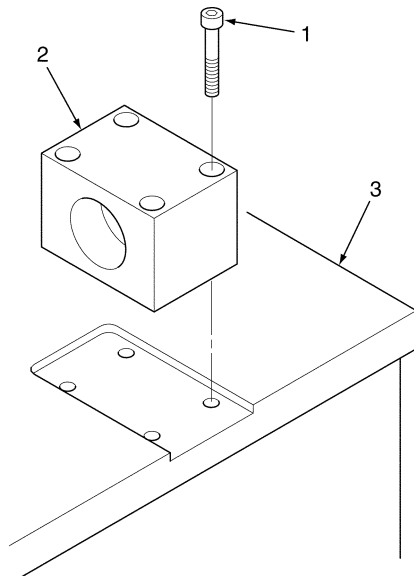
Shocks are installed by screwing them into the threaded holes in the shock mounts and tightening the nylon setscrew. Check adjustment (see 5-11). See initial turntable power-up (4-1) before restarting system.

ITW0034

5-13. Shock Absorber Mount Replacement



▲ Disconnect power before maintaining.



The shock absorber mounts will not wear out. If damage occurs, they may be replaced.

Turn off welding power supply and control unit, and disconnect input power.

Remove shock absorbers (see 5-12).

- 1 Socket Head Capscrew
- 2 Shock Absorber Mount
- 3 Base

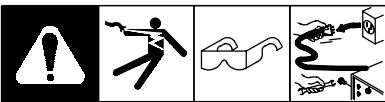
Remove four socket head capscrews from each shock mount. Slide mounts from base.

Position new shock mounts on base with threaded side toward motor side of base. Align holes and install four socket head capscrews in each. Tighten capscrews.

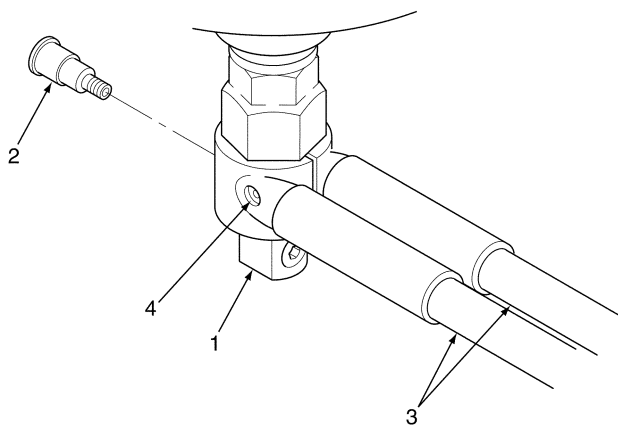
Install (see 5-12) and adjust (see 5-11) shock absorbers.

ITW0029

5-14. Rotary Ground Service



▲ Disconnect power before maintaining.



Turn off welder power supply and control unit, and disconnect turntable input power.

- 1 Rotary Ground

Remove six screws and base cover from base. Check that two socket head capscrews in rotary ground are tight.

- 2 Cup

Remove cup from rotary ground. Fill cup with Tweco Electrical Joint Compound and Lubricant. Turn cup down to force lubricant onto shaft. Use lubricant sparingly, do not overlubricate.

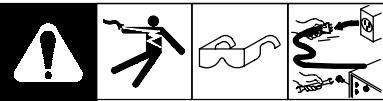
- 3 Grounding Wires
- 4 Setscrews

Check tightness of grounding wires into rotary ground. If loose, tighten setscrews.

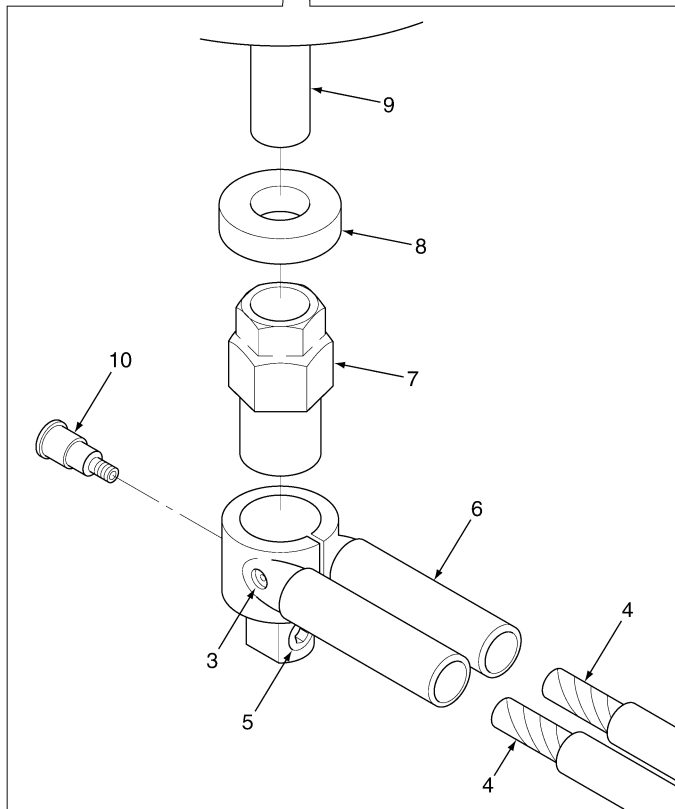
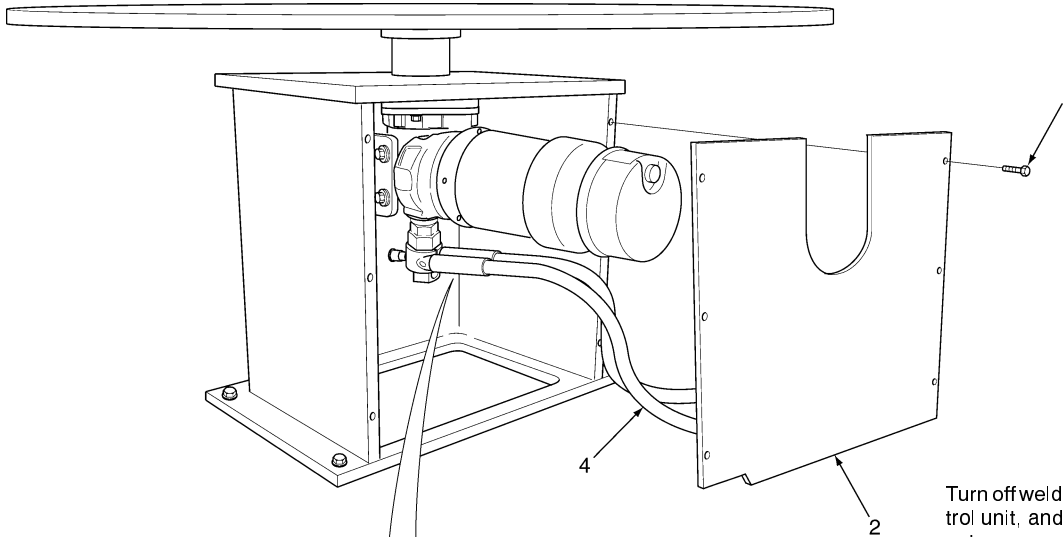
Install base cover on base with six screws.

ITW0030

5-15. Rotary Ground Replacement



▲ Disconnect power before maintaining.



Turn off welder power supply and control unit, and disconnect turntable input power.

- 1 Screw
- 2 Cover
- 3 Setscrew
- 4 Grounding Cables
- 5 Socket Head Capscrews
- 6 Rotary Ground
- 7 Grounding Nut
- 8 Collar
- 9 Shaft

Remove six screws and base cover from base. Loosen setscrews and remove grounding cables. Loosen two socket head capscrews and remove rotary ground from grounding nut. If damaged, remove grounding nut from collar, and collar from shaft.

Install grounding nut and collar on shaft. Apply Tweco Electrical Joint Compound to mating surfaces and install rotary ground on grounding nut. Tighten two socket head capscrews.

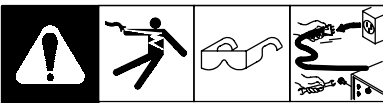
10 Cup

If installing a new rotary ground, be sure to install lubricating cup in hole at top of rotary ground head. Fill cup with Tweco Electrical Joint Compound and Lubricant. Turn cup down to force lubricant onto shaft.

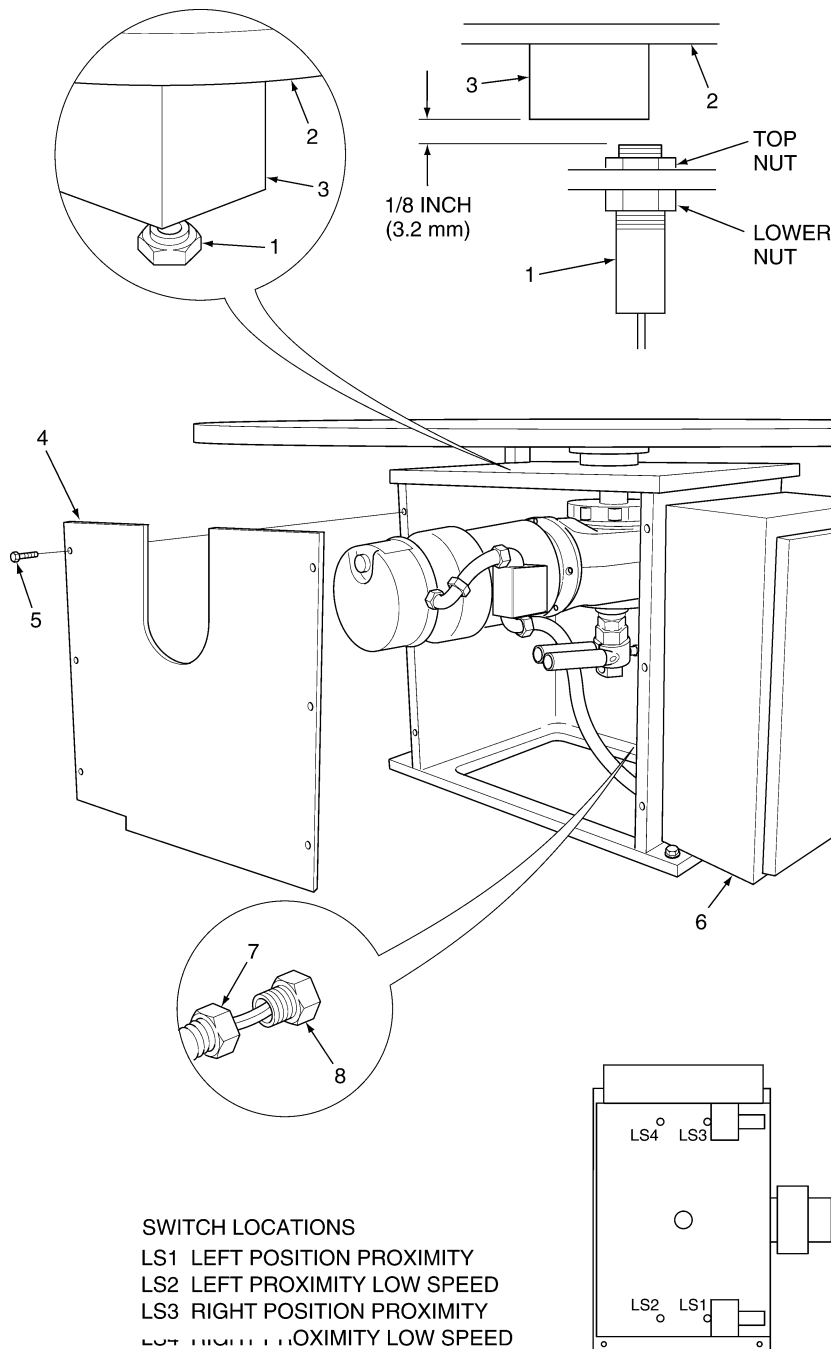
Install grounding wires into rotary ground, and tighten setscrews. Install base cover on base with six screws.

ITW0031

5-16. Proximity Switch Replacement and Adjustment



▲ Disconnect power before maintaining.



SWITCH LOCATIONS

LS1 LEFT POSITION PROXIMITY
LS2 LEFT PROXIMITY LOW SPEED
LS3 RIGHT POSITION PROXIMITY
LS4 RIGHT PROXIMITY LOW SPEED

Turn off welding power supply and control unit, and disconnect input power.

- 1 Proximity Switch
- 2 Turntable Top
- 3 Stop Block

Release turntable motor brake (see 4-4). Rotate turntable top so that stop block is not covering proximity switches.

☞ All four proximity switches are replaced in the same way.

- 4 Base Cover
- 5 Capscrew

To remove proximity switch, remove six screws and base cover. Remove top nut and pull proximity switch through hole in base.

- 6 Electronic Control Box
- 7 Nut
- 8 Fitting

Open electronic control box cover. Locate, tag, and record positions of all wires leading to proximity switches to be removed (see NO TAG). Loosen screws and remove wires. Loosen nut, and pull proximity switch wires from fitting.

To install proximity switch, loosen nut, and feed proximity switch wires through nut and then fitting. Tighten nut. Install proximity switch wires (see NO TAG) and tighten screws. Close electronic control box cover.

Remove top nut from proximity switch. Position proximity switch in hole in base. Install nut, but do not tighten until switch is adjusted.

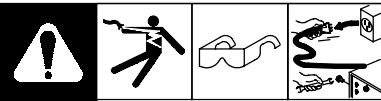
To adjust proximity switch, position stop block above proximity switch. Ideal clearance is 1/8 inch (3.2 mm). Never allow more than 1/4 inch (6.4 mm) or switch will not operate correctly. Clearance is adjusted by turning lower nut of switch until desired height is achieved. Tighten top nut.

Install base cover with six screws.

See initial turntable power-up (See 4-2) before restarting system.

ITW0041

5-17. Electronic Control Box Replacement



▲ Disconnect power before maintaining.

Note: the PLC control panel comes with power cable, motor wires, and proximity switches in place.

Turn off welder power supply and control unit, and disconnect turntable input power.

Remove power cable from power disconnect (see 3-6). Disconnect safety mat from electronic control box (see 3-10). Remove six screws and base cover from base. Disconnect input/output cable from connector at electronic control box (see 3-8).

- 1 Junction Box Cover
- 2 Capscrew
- 3 Nut
- 4 Conduit
- 5 Fitting

Remove two screws and electric motor junction box cover. Locate, tag, and record positions of four wires leading to electronic control box (see NO TAG). Loosen four screws and remove four wires. Loosen nut, and pull wires and conduit from fitting. Install nut on fitting.

- 6 Electronic Control Box
- 7 Proximity Switch
- 8 Stop Block

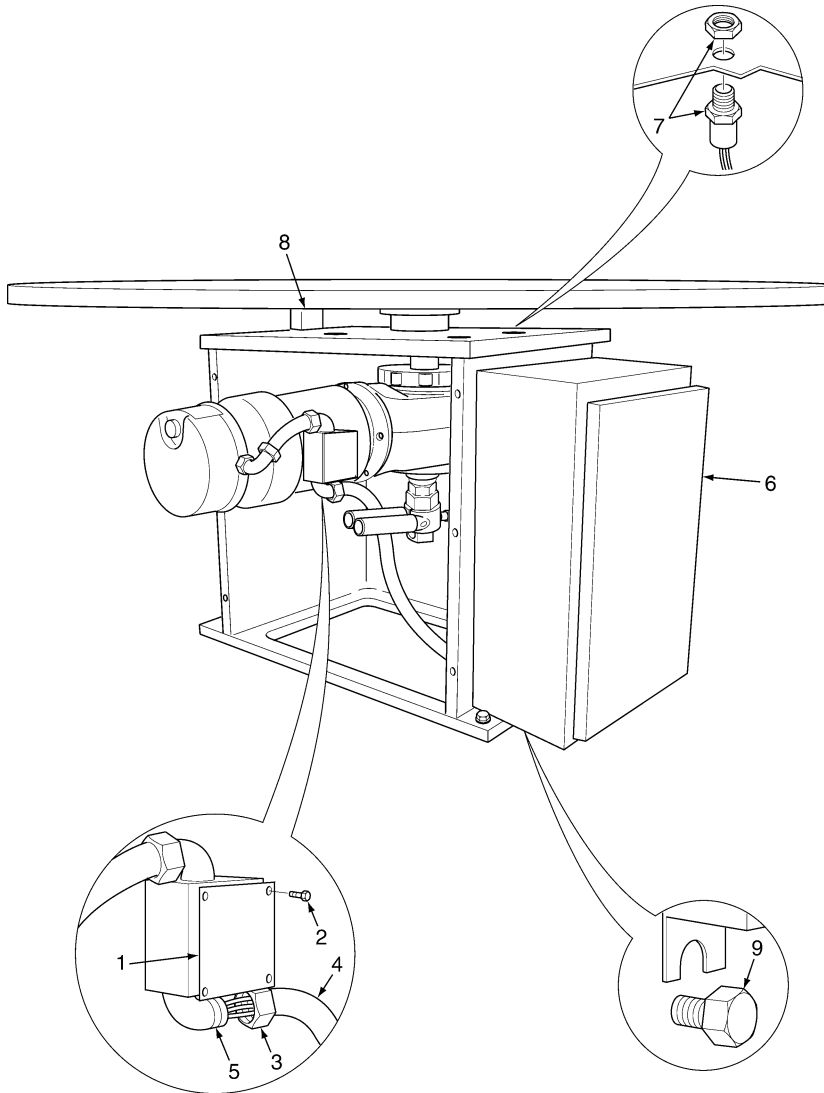
Release turntable motor brake (see 4-4), and rotate turntable top until stop block does not cover proximity switches. Remove top nuts and four proximity switches from base. Loosen two lower capscrews and remove two upper capscrews and electronic control box from base.

- 9 Capscrew

Feed proximity switches and wiring through cutout in base. Position new electronic control box on two lower capscrews. Align holes and install two upper capscrews. Tighten all four capscrews. Loosen nut, and feed wires and conduit through nut and then fitting in junction box. Tighten nut on fitting. Install wires (see NO TAG) and tighten screws. Install junction box cover with two screws. Install and adjust proximity switches (see 5-16). Connect input/output cable to connector at electronic control box (see 3-6). Connect safety mat to electronic control box (see 3-10). Install power cable to power disconnect (see 3-6).

See initial turntable power-up (4-1) before restarting system.

ITW0042



5-18. Troubleshooting

Trouble	Remedy	Section
Turntable top does not turn.	Be sure that emergency stop is not engaged. Press reset button.	4-2, 4-3
	Check that motor brake is properly adjusted.	4-4
	Be sure input power is not disconnected.	3-6
	Be sure fuse is OK.	5-5
	Check for power to motor.	7-1
Turntable top turns slowly or jerks.	Check that motor brake is properly adjusted.	5-6
	Check that motor is properly mounted to gearbox, and mounting hardware has not come loose.	5-7
	Check that shaft bearing is properly lubricated.	5-2
Electric Motor Smoke.	Check that motor is clean.	5-1
	Check that motor brake is properly adjusted.	5-6
	Have a qualified person check that power connection is installed properly.	3-6
Electric motor brake is noisy.	Be sure clutches are not out of adjustment or completely worn.	5-6
Turntable top does not slow before stopping or does not stop until stops hit shock absorbers.	Check that motor brake is properly adjusted.	5-6
	Check that proximity switches are properly adjusted.	5-16
	Check that proximity switches are operating.	5-16
Turntable top is wobbly.	Check that all mounting hardware is tight and in place.	3-4
	Check that gearbox is properly mounted.	5-8

SECTION 6 - TABLES

RDS PROGRAMS

Table 6-1. RDS Programs (Part 1 of 2)

Program 900	Master Program
001 P	Home Point
002 CL P901	Turntable Program
003 CL N002 P???	Enter Program Number for part on this side of table
004 CL N003 P???	Enter Program Number for part on this side of table
005 P	Home Point
006 END	

Program 901	Turntable Program
001 P	Home Point
002 S005	Set Output 5 (Rotate Table)
003 NOP	
004 R005	Reset Output 5
005 N001	Wait for Table to rotate into position (Input 001)
006 P	
007 END	

RDS w/Turntable Sequencer File Sequence File #2

Table 6-1. RDS Programs (Part 2 of 2)

001	NOP		
002	SET	I285, #001	
003	SET	I287, #001	
004	SET	I289, #000	
005	SET	I290, #001	
006	NOP		
007	LD	O264	
008	OUT	I270	
009	NOP		
010	LD	O338	
011	OUT	I308	
012	LD	O264	Sequences 12-14 confirm the robot is in start enable area, before the turntable is allowed to rotate.
013	AND	O005	
014	OUT	O101	
015	LD-NOT	O200	Sequences 15-21 enable the turntable to rotate, after an E-stop is cleared, and the table is in position, without having to press the turntable reset button.
016	AND	I001	
017	OUT	A001	
018	LD	A001	
019	OUT	PLS01, #010	
020	LD	PLS01	
021	OUT	O009	
022	END		
Reassign Output 005 to Output 101			

RDS SYSTEM PARAMETER MODIFICATIONS

Soft Limit Modifications

Axis 1 138 -138

Start Enable Modifications

Axis 2 -30 -573

Axis 3 573 40

Start Enable In Auto ON

Table 6-2. AC Inverter Drive Programmable Parameter Menu (Part 1 of 2)

PARAMETER MENU				
Param. Number	Parameter Name	Range of Adjustment	Factory Default	Current Setting
0	LINE VOLTS	HIGH, LOW	HIGH	HIGH
1	SPEED #1	MIN FRQ - MAX FRQ	20.00 HZ	50.00 HZ
2	SPEED #2	MIN FRQ - MAX FRQ	20.00 HZ	3.75 HZ
3	SPEED #3	MIN FRQ - MAX FRQ	20.00 HZ	15.00 HZ
4	SPEED #4	MIN FRQ - MAX FRQ	20.00 HZ	15.00 HZ
5	SKIP #1	MIN FRQ - MAX FRQ	.00 HZ	.00 HZ
6	SKIP #2	MIN FRQ - MAX FRQ	.00 HZ	.00 HZ
7	BAND WID	.00 - 10.00 HZ	.00 HZ	.00 HZ
8	ACCEL	0.1 - 3600 SEC (NOTE 1)	30.0 SEC	1.7 SEC
9	DECEL	NOTE 2	30.0 SEC	.8 SEC
10	MIN FRQ	.00 - 120.0 HZ (NOTE 3)	.50 HZ	2.00 HZ
11	MAX FRQ	1.00 - 120.0 HZ (NOTE 3)	60.00 HZ	60.00 HZ
12	DC BRAKE	NOTE 2	.0 VDC	.0 VDC
13	DC TIME	.0 - 999.9 SEC	.0 SEC	.0 SEC
14	DYN BRAKE	OFF, ON	OFF	OFF
16	CURRENT	25 - 180% (NOTE 3)	180%	180%
17	MOTOR OL	25 - 100%	100%	74%
18	BASE	20.00 - 360.0 HZ	60.00 HZ	60.00 HZ
19	FX BOOST	.0 - 30.0%	NOTE 2	8.5%
20	AC BOOST	.0 - 20.0%	.0%	.0%
21	SLIP CMP	.0 - 5.0%	.0%	3.0%
22	TORQUE	CONSTANT, VARIABLE	CONSTANT	CONSTANT
23	CARRIER	2.5, 8, 10, 12, 14 KHA	2.5 KHZ	2.5 KHZ
25	START	NORMAL, POWER-UP, AUTO-RE, RE-BRAKE	NORMAL	NORMAL
26	STOP	RAMP, COAST	COAST	COAST
27	ROTATION	FORWARD, REVERSE FWD & REV, FWD@LOC	FORWARD	FOR & REV
28	AUTO/MANUAL	AUTO, MANUAL, BOTH	BOTH	AUTO
29	MANUAL	KEYPAD, 0-10 VDC	KEYPAD	KEYPAD
30	CONTROL	LOCAL, REMOTE, BOTH	LOCAL	REMOTE
31	HZ UNITS	HERTZ, RPM, % HZ, /SEC, /MIN, /HR, NONE	HERTZ	HERTZ
32	HZ MULT	.10 - 650.0	1.00	1.00
33	SPEED DP	XXXXX, XXX.X, XX.XX, X.XXX, XXXX	XXXXX	XXXXX
34	LOAD MLT	95 - 139%	100%	100%
35	CONTRACT	LOW, MED, HIGH	MED	MED
39	TB5 MIN	.00 - 360.0 HZ	.00 HZ	.00 HZ
40	TB5 MAX	.00 - 360.0 HZ	60.00 HZ	60.00 HZ
42	TB10A OUT	NONE, 0 - 10V, 2 - 10V	NONE	NONE
43	@TB10A	3.00 - 360.0 HZ (NOTE 3)	60.00 HZ	60.00 HZ
44	TB10B OUT	NONE, 0 - 10V, 2 - 10V	NONE	NONE
45	@TB10B	10 - 200%	125%	125%
47	TB13A	NONE, 0 - 10VDC, 4 - 20MA, SPEED #1, LOC SEL, DEC FREQ	NONE	SPEED #1

Table 6-2. AC Inverter Drive Programmable Parameter Menu (Part 2 of 2)

PARAMETER MENU				
Param. Number	Parameter Name	Range of Adjustment	Factory Default	Current Setting
48	TB13B	NONE, 0 - 10VDC, 4 - 20MA, SPEED #2, INC FREQ, JOG FWD, JOG REV	NONE	SPEED #2
49	TB13C	NONE, 0 - 10VDC, 4 - 20MA, SPEED #3, INC SEL, RUN REV, STRT REV	NONE	STRT REV
50	TB13B EXT	FAULT, /FAULT	FAULT	FAULT
52	TB14OUT	NONE, RUN, FAULT, /FAULT, LOCK, @SPEED, ABOVE #3, 1 LIMIT, AUTO/MAN	NONE	NONE
53	TB15OUT	NONE, RUN, FAULT, /FAULT, LOCK, @SPEED, ABOVE #3, 1 LIMIT, AUTO/MAN	NONE	NONE
54	RELAY	NONE, RUN, FAULT, /FAULT, LOCK, @SPEED, ABOVE #3, 1 LIMIT, AUTO/MAN	NONE	/FAULT
57	SERIAL	DISABLE, ENABLE	DISABLE	DISABLE
58	ADDRESS	1 - 30	30	30
61	PASSWORD	0000 - 9999	0019	0019
63	SOFTWARE	VIEW - ONLY	N/A	N/A
64	MONITOR	OFF, ON	ON	ON
65	PROGRAM	MAINTAIN, RESET 60, RESET 50	RESET 60	MAINTAIN
66	HISTORY	MAINTAIN, CLEAR	MAINTAIN	MAINTAIN
69	LANGUAGE	NOTE 2	ENGLISH	ENGLISH
70	FAULT HISTORY	VIEW - ONLY	N/A	N/A

NOTE 1: RANGE FOR 25-HP UNIT: 0.3-3600 SEC.

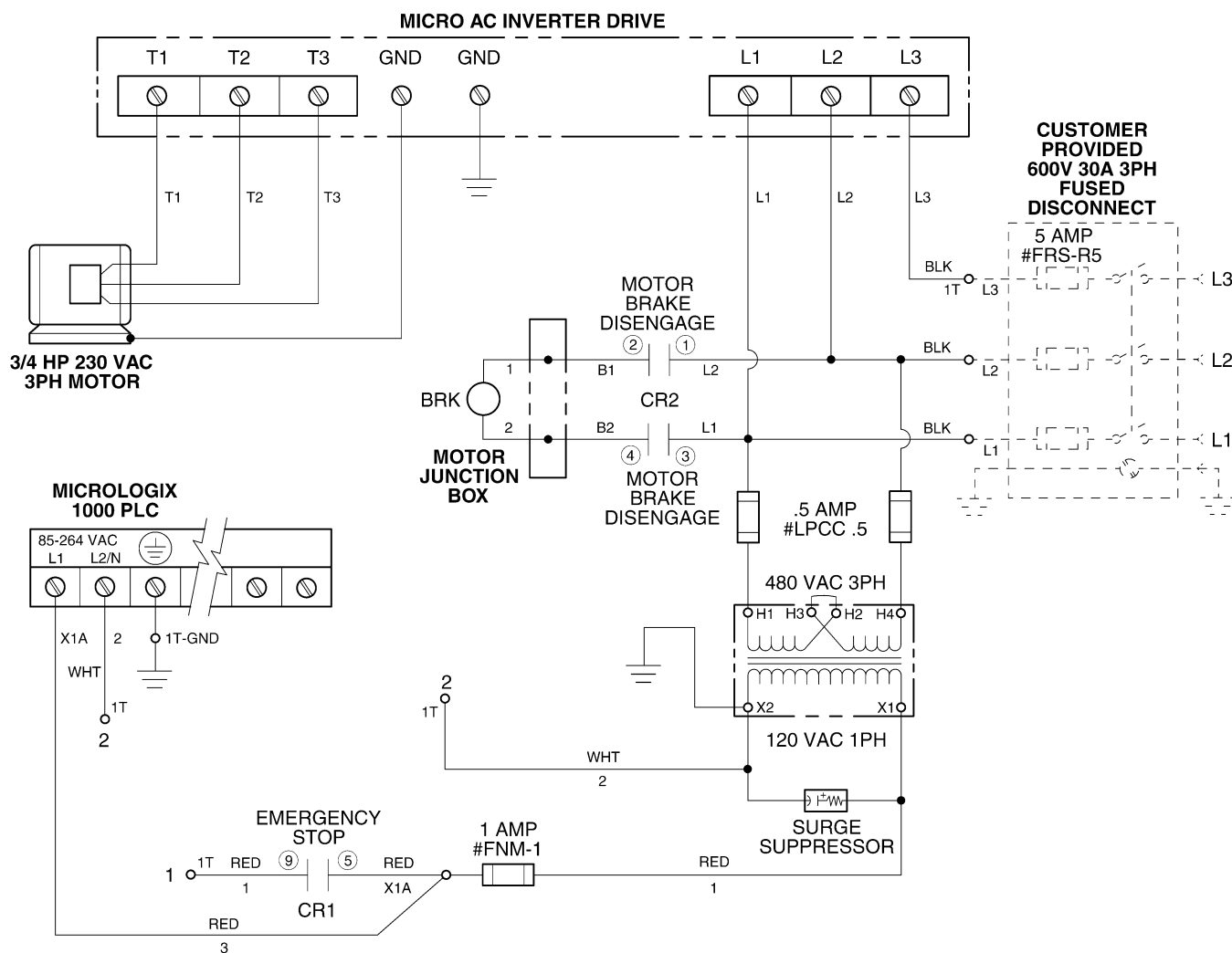
NOTE 2: REFER TO SECTION 18.0 - DESCRIPTION OF PARAMETERS.

NOTE 3: IF LINE VOLTS IS SET TO "LOW", RANGE IS 25-150%.

Table 6-3. PLC Control Input/Output

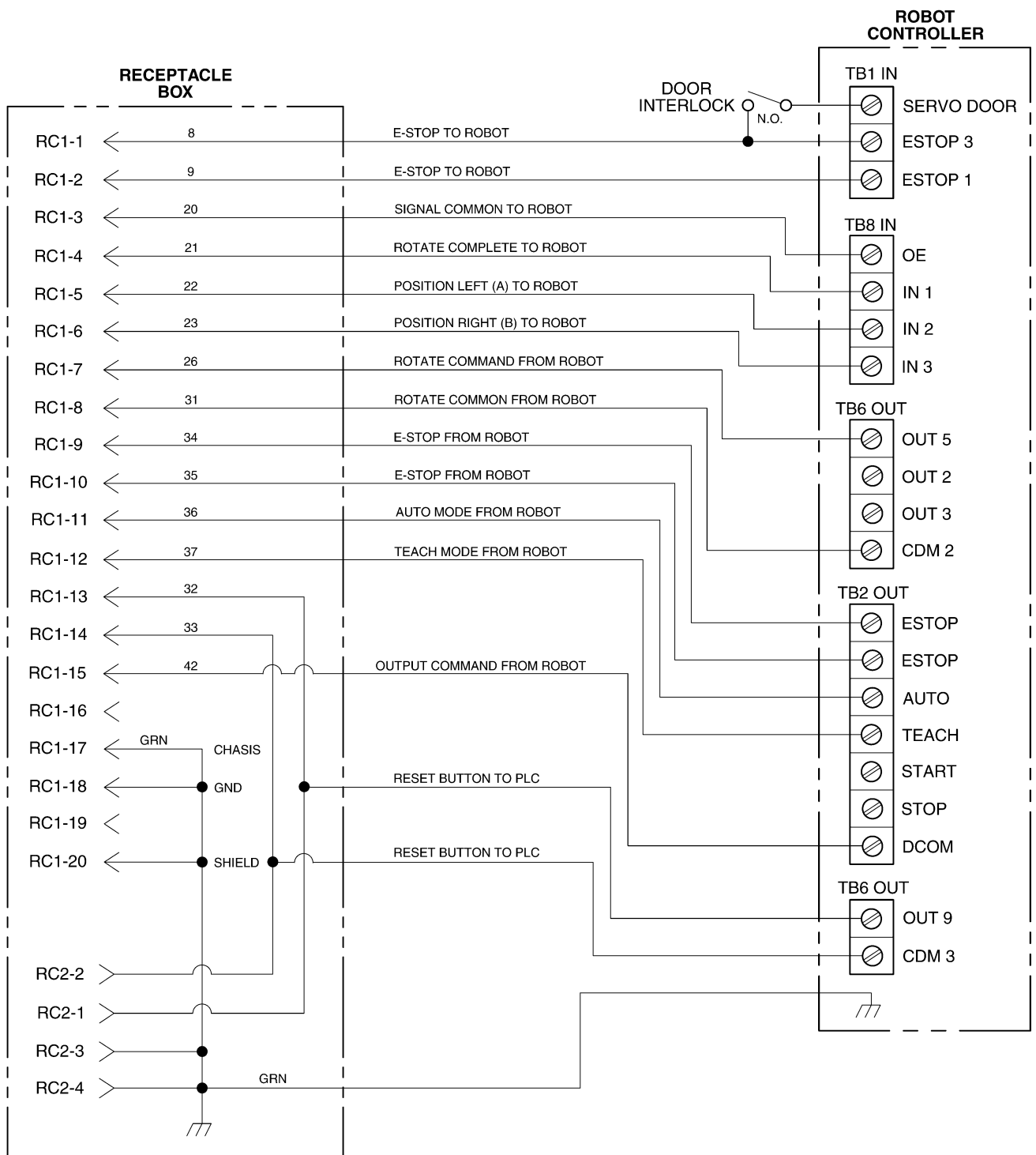
Micrologix 1000 PLC I/O Number	I/O Description	
INPUT 0 (I:0\0)	Safety Mat	
INPUT 1 (I:0\1)	Rotate Turntable (from Robot)	
INPUT 2 (I:0\2)	Left Position Proximity Switch	
INPUT 3 (I:0\3)	Left Low Speed Proximity Switch	
INPUT 4 (I:0\4)	Right Position Proximity Switch	
INPUT 5 (I:0\5)	Right Low Speed Proximity Switch	
INPUT 6 (I:0\6)	Robot in Auto Mode	
INPUT 7 (I:0\7)	Robot in Teach Mode	
INPUT 8 (I:0\8)	Robot Emergency Stop	
INPUT 9 (I:0\9)	Turntable Reset Switch	
INPUT 10 (I:0\10)	Spare	
INPUT 11 (I:0\11)	Spare	
INPUT 12 (I:0\12)	Spare	
INPUT 13 (I:0\13)	Spare	
INPUT 14 (I:0\14)	Spare	
INPUT 15 (I:0\15)	Spare	
INPUT 16 (I:0\16)	Spare	
INPUT 17 (I:0\17)	Spare	
INPUT 18 (I:0\18)	Spare	
INPUT 19 (I:0\19)	Spare	
OUTPUT 0 (O:0\0)	Motor Brake Engage	
OUTPUT 1 (O:0\1)	Turntable Rotate Complete (To Robot)	
OUTPUT 2 (O:0\2)	Turntable in Left Position (To Robot)	
OUTPUT 3 (O:0\3)	Turntable in Right Position (To Robot)	
OUTPUT 4 (O:0\4)	Motor Drive Start/Stop	
OUTPUT 5 (O:0\5)	Motor Drive Forward (Table Lt. or CCW)	
OUTPUT 6 (O:0\6)	Motor Drive Reverse Forward (Table Rt. or CW)	
OUTPUT 7 (O:0\7)	Spare	
OUTPUT 8 (O:0\8)	Motor Drive Speed #1 (High Speed)	Both = Speed # 3 (Teach Speed)
OUTPUT 9 (O:0\9)	Motor Drive Speed #2 (Low Speed)	
OUTPUT 10 (O:0\10)	Spare	
OUTPUT 11 (O:0\11)	Spare	

SECTION 7 - ELECTRICAL DIAGRAMS



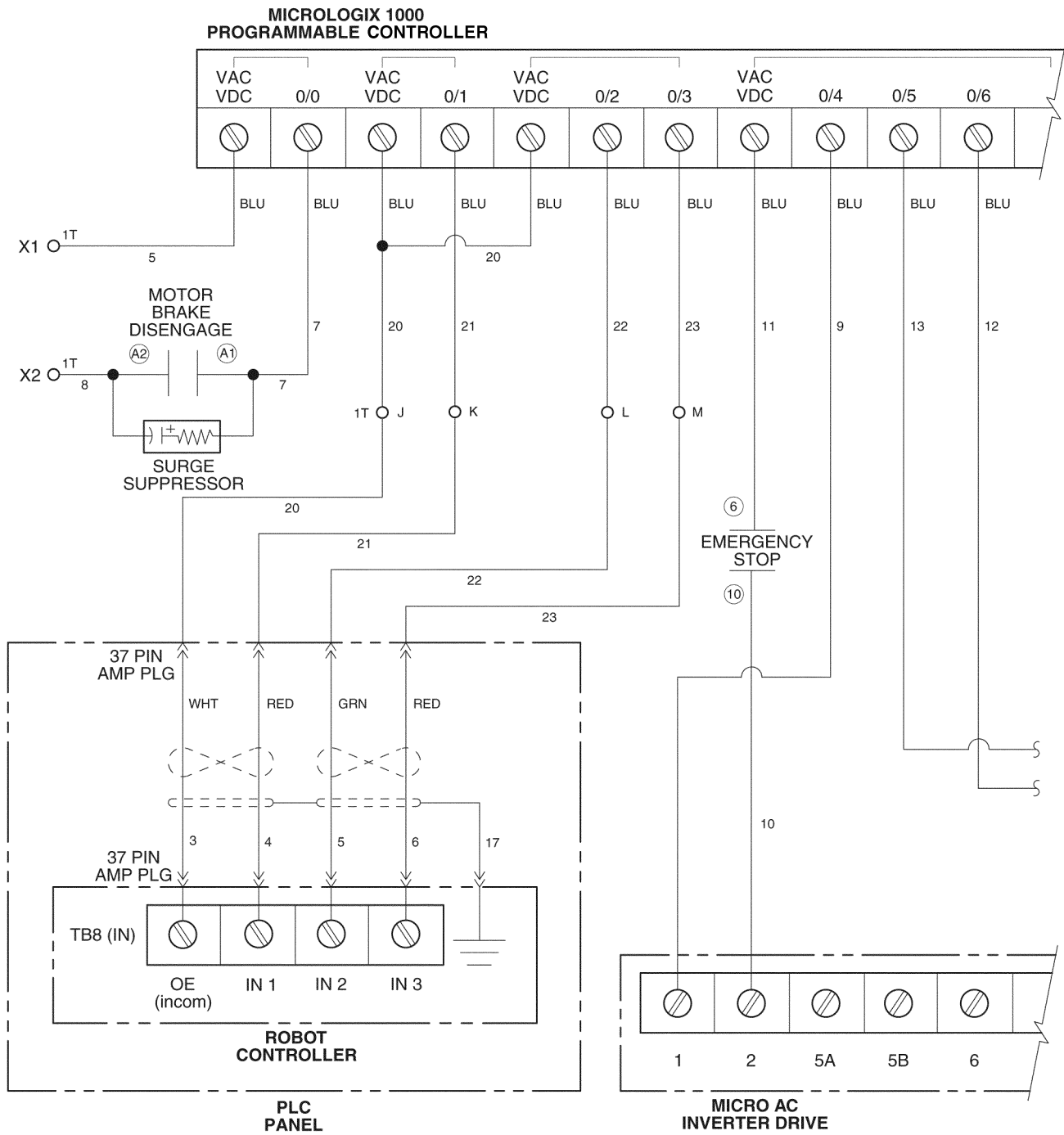
ITW0001

Figure 7-1. PLC Panel Input Power



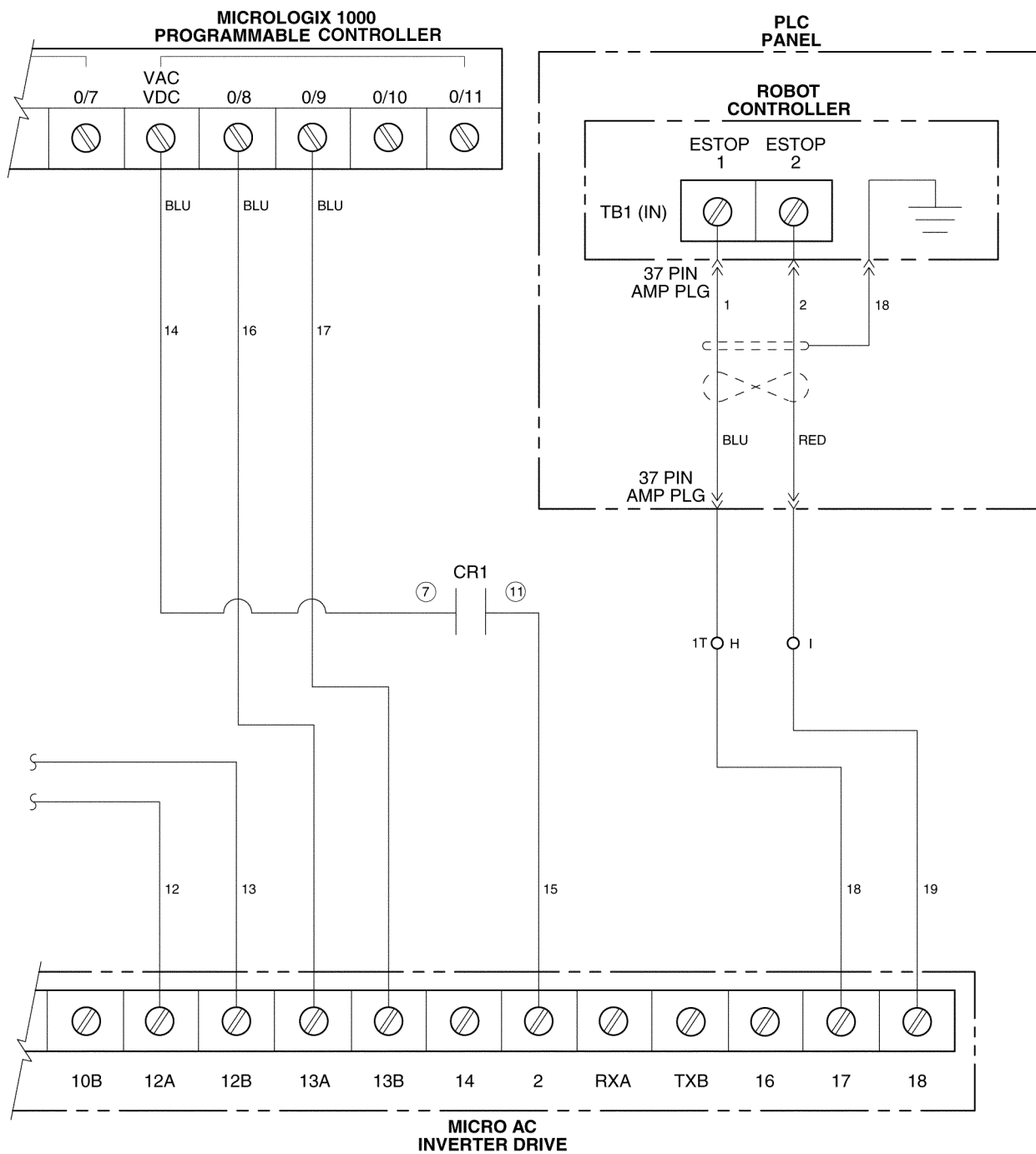
ITW0004

Figure 7-2. Receptacle Box Circuit



ITW0002

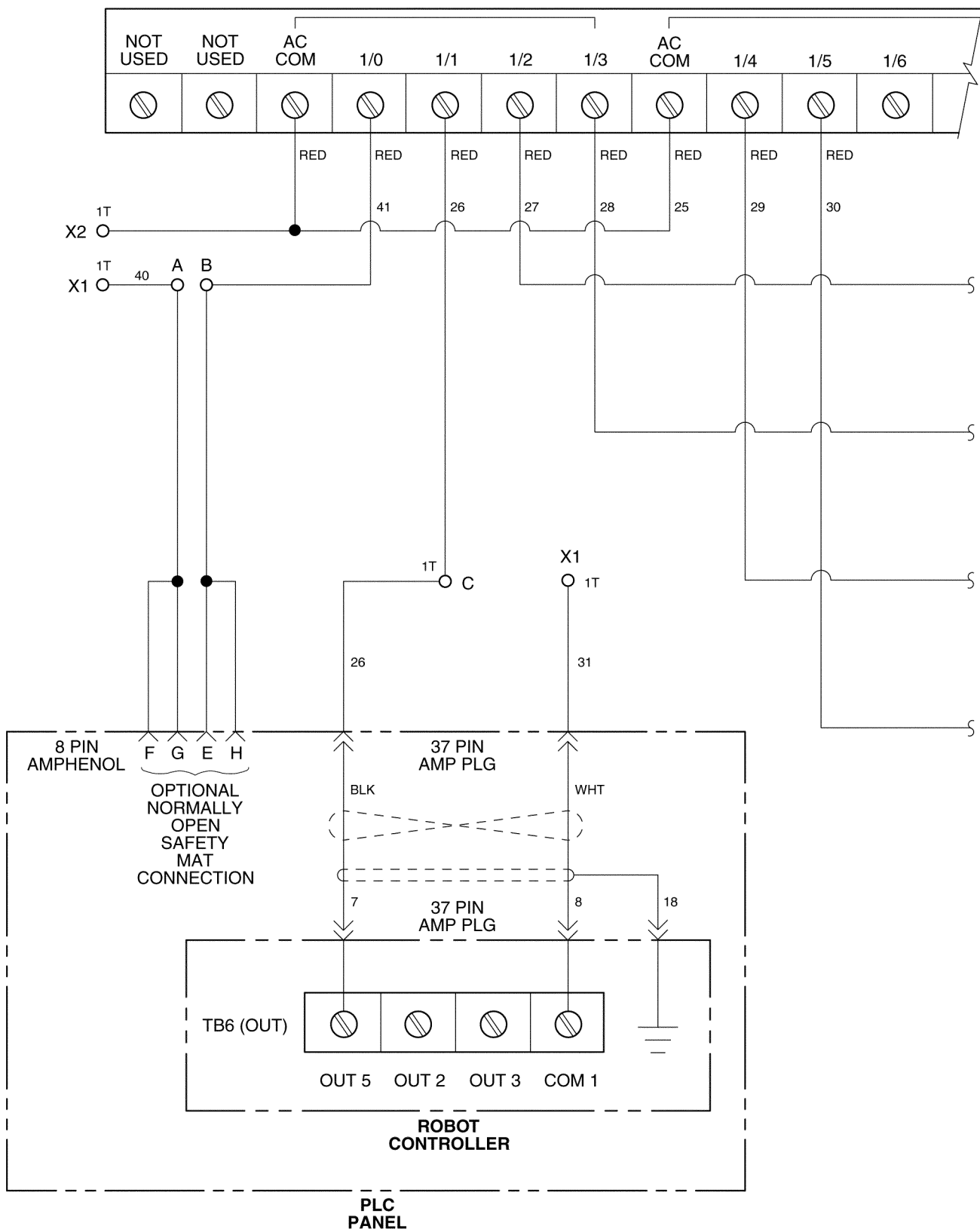
Figure 7-3. PLC Output (Part 1 of 2)



ITW0003

Figure 7-3. AC Inverter Drive Programmable Parameter Menu (Part 2 of 2)

**MICROLOGIX 1000
PROGRAMMABLE CONTROLLER**

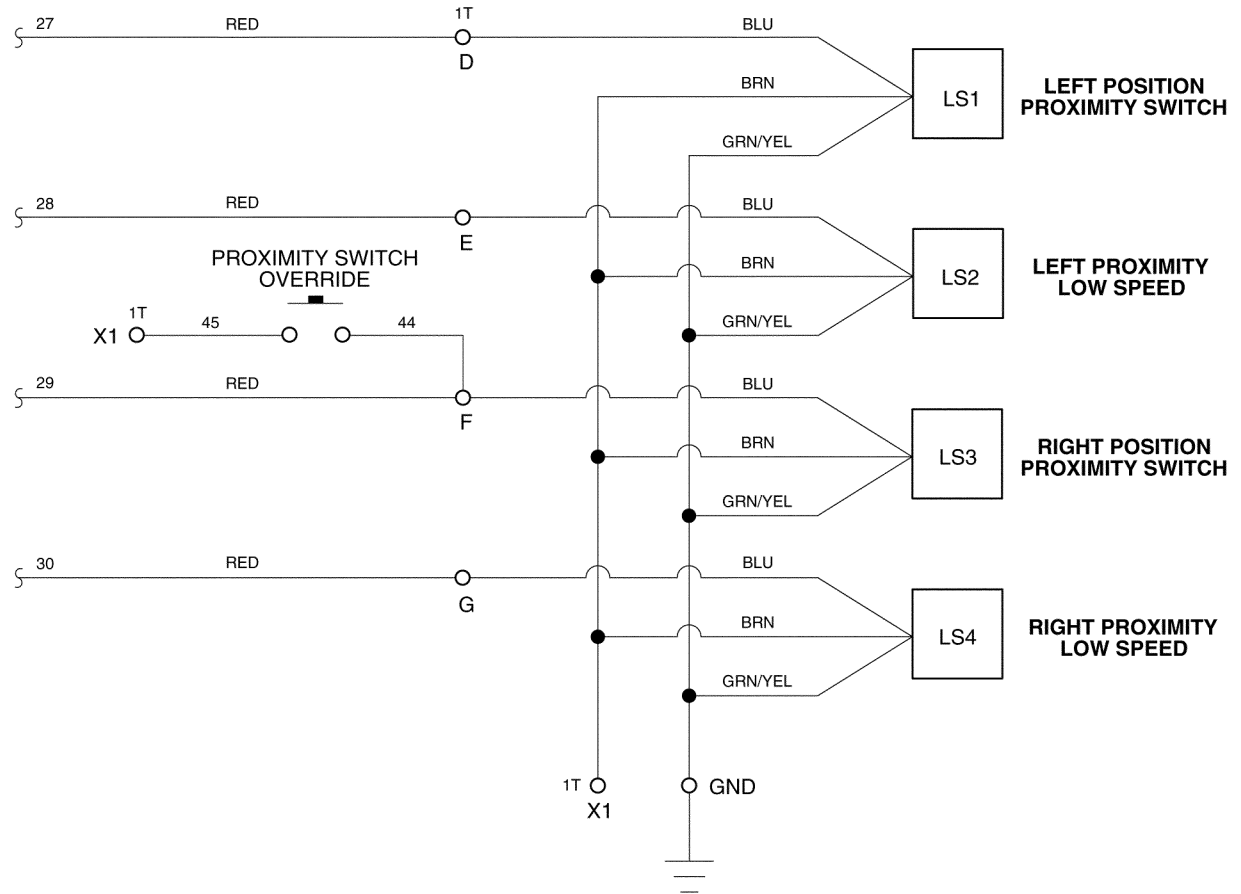


ITW0005

Figure 7-4. PLC Input (Part 1 of 4)

**MICROLOGIX 1000
PROGRAMMABLE CONTROLLER**

1/7	1/8	1/9	1/10	1/11	1/12	1/13	1/14	1/15	1/16	1/17	1/18	1/19

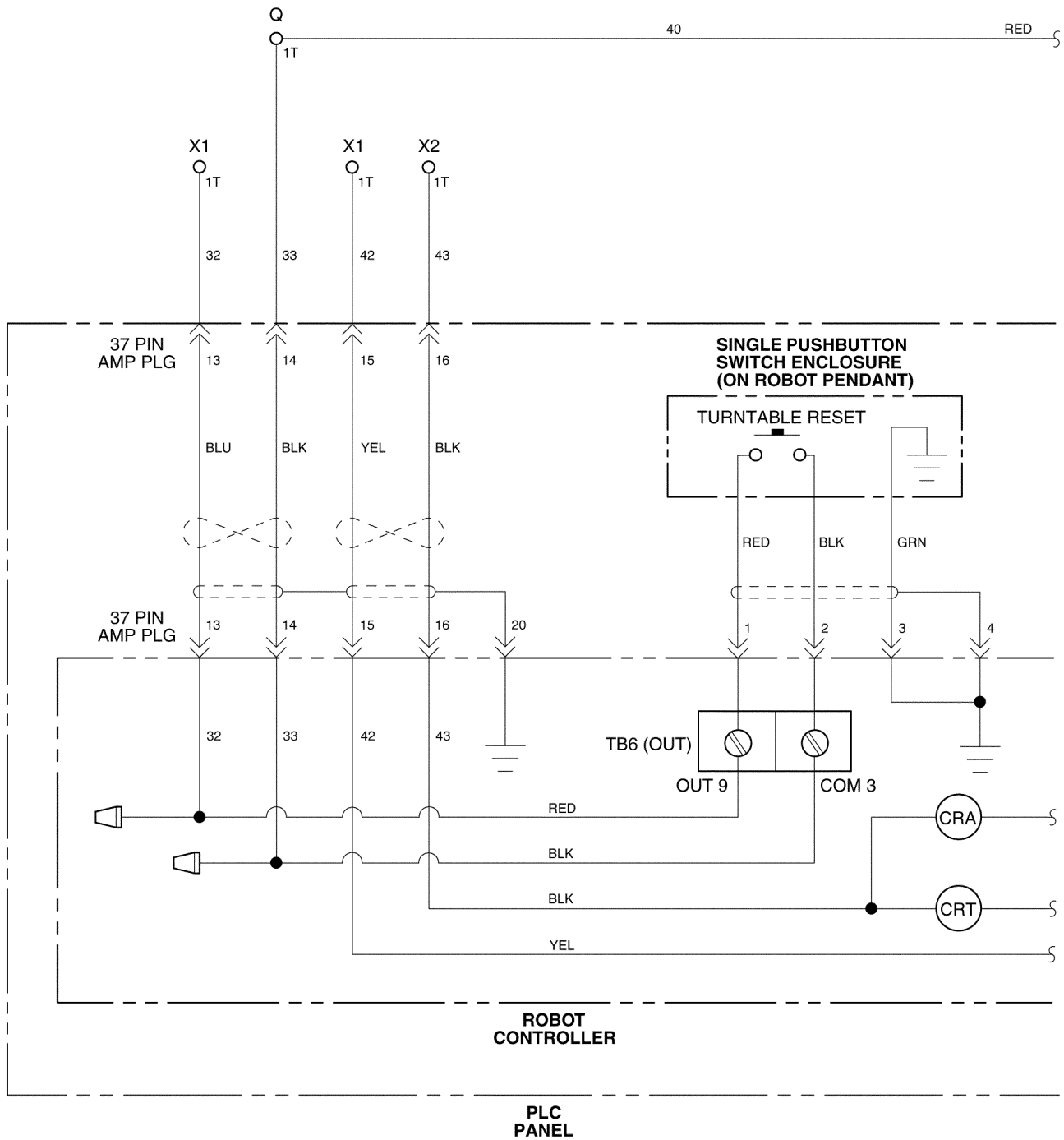


ITW0006

Figure 7-4. PLC Input (Part 2 of 4)

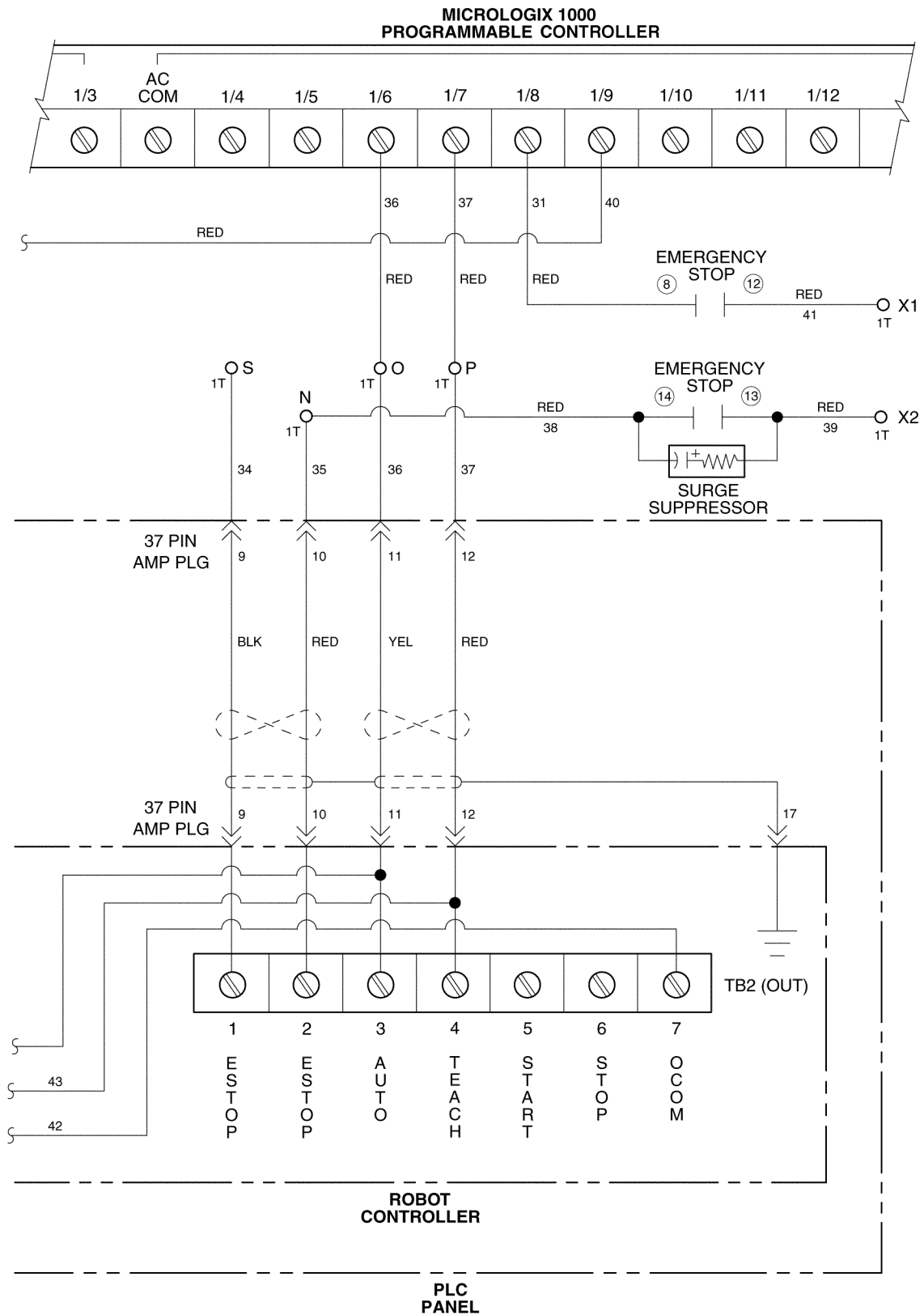
**MICROLOGIX 1000
PROGRAMMABLE CONTROLLER**

NOT USED	NOT USED	AC COM	1/0	1/1	1/2



ITW0007


Figure 7-4. PLC Input (Part 3 of 4)



ITW008

Figure 7-4. PLC Input (Part 4 of 4)

SECTION 8 - PARTS LIST

 Hardware is common and not available unless listed.

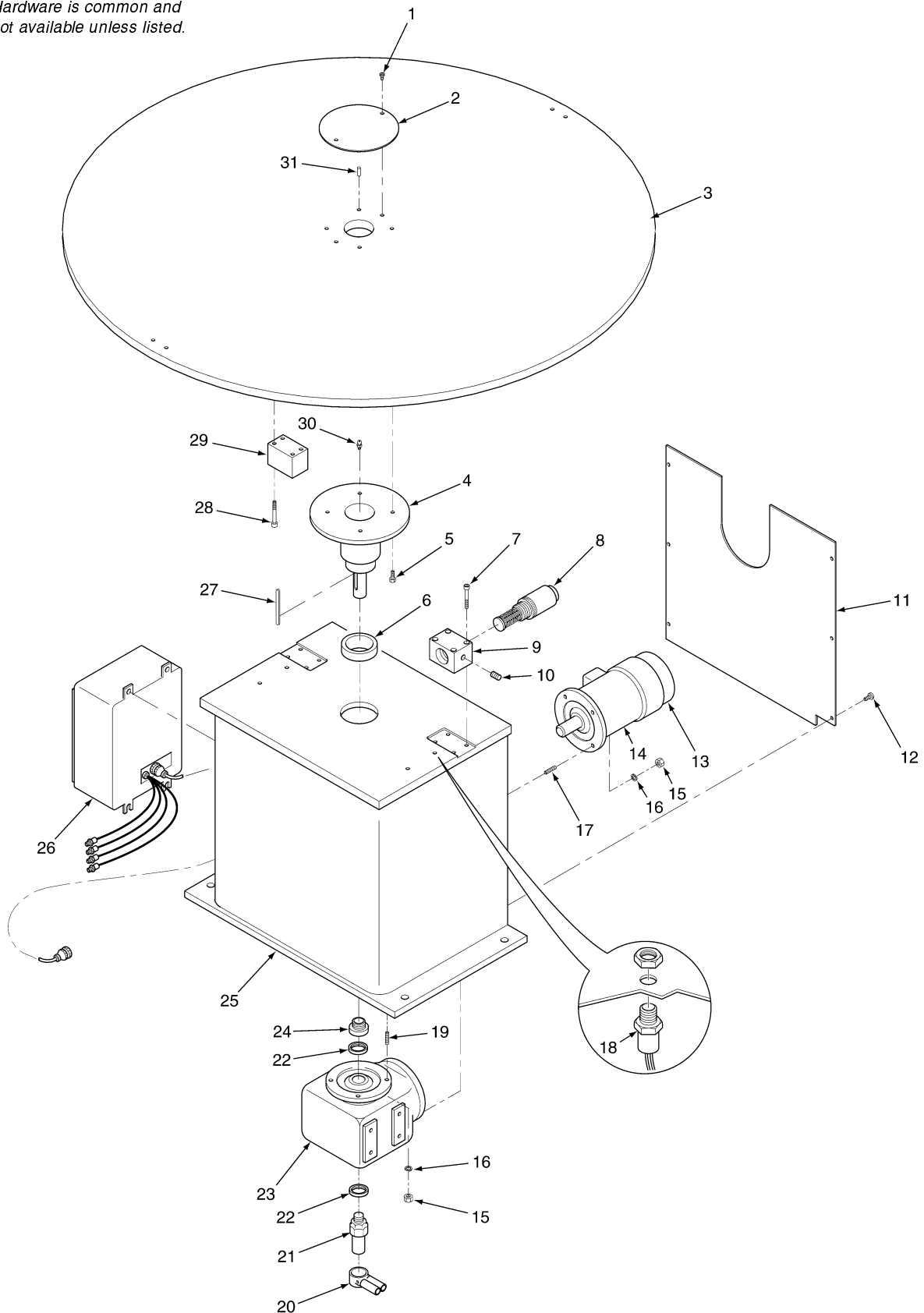
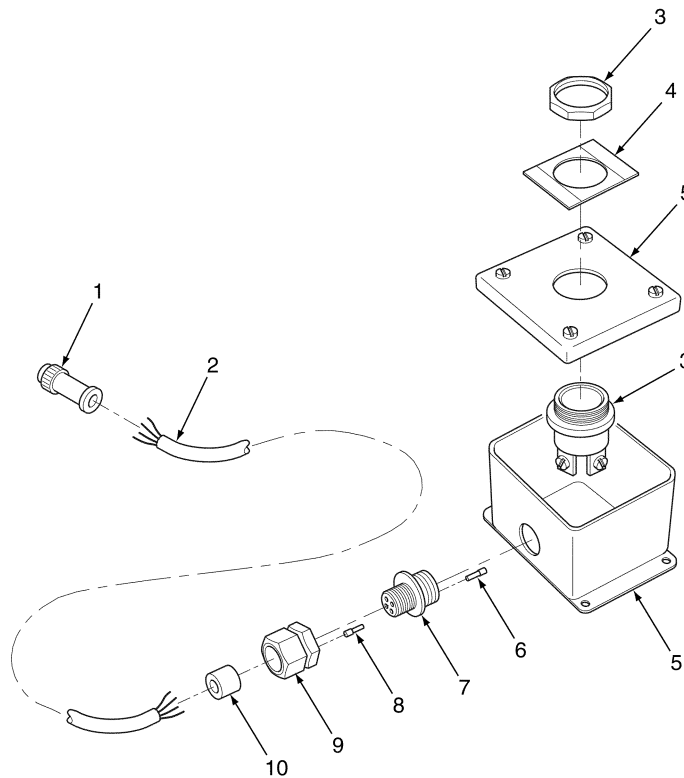


Figure 8-1. T60 Indexing Turntable

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
185 669 Figure 8-1. T60 Indexing Turntable				
... 1		189 308	.. SCREW, Cap Button Head 1/2"-13 x 1/2"	2
... 2		189 309	.. COVER, Table	1
... 3		189 310	.. TOP, Turntable	3
... 4		189 311	.. ASSEMBLY, Shaft	1
... 5		189 312	.. SCREW, Cap Hex Head 1/2"-13 x 1-1/2"	6
... 6		189 313	.. BUSHING, Brass	1
... 7		189 314	.. SCREW, Cap Socket Head 1/4"-20 x 4"	8
... 8		186 373	.. SHOCK, Pneumatic, 1-1/8" Bore, 2" Stroke, Primary Mt.	2
... 9		189 315	.. MOUNT, Shock	2
... 10		189 316	.. SCREW, Set Nylon	2
... 11		189 317	.. COVER, Base	1
... 12		189 318	.. SCREW, Cap Button Head, #10-24 x 1/2"	6
... 13		186 370	.. MOTOR, Electric, AC, (1.5 Hp, 1725 Rpm, 460Vac, 3Ph)	1
... 14		186 371	.. KIT, Brake	1
... 15		189 319	.. NUT, Hex 3/8"-16	8
... 16		189 320	.. WASHER, Lock 3/8" Std.	8
... 17		189 321	.. SCREW, Set 3/8"-16 x 1-1/4"	4
... 18	SW2	186 374	.. SWITCH, Inductive Proximity ,120Vac, Shielded, Normally Open, 5mm	4
... 19		189 322	.. SCREW, Set 3/8"-16 x 2"	4
... 20		189 323	.. GROUND, Rotary	1
... 21		189 324	.. NUT, Grounding	1
... 22		189 325	.. KIT, Seal	2
... 23		186 376	.. REDUCER, Speed, 100:1 Ratio	1
... 24		189 326	.. COLLAR, One-piece, Threaded	1
... 25		189 327	.. BASE ASSEMBLY	1
... 26		189 368	.. PLC CONTROL PANEL	1
... 27		186 329	.. KEYSTOCK, 3/8" x 5-1/2" L	1
... 28		189 330	.. SCREW, Cap Socket Head, 1/4"-20 x 3-1/2"	4
... 29		189 331	.. BLOCK, Turntable Stop	1
... 30		189 332	.. FITTING, Grease Straight 1/8" NPT	1
... 31		189 333	.. PIN, Roll 1/2" x 1-1/2"	4

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

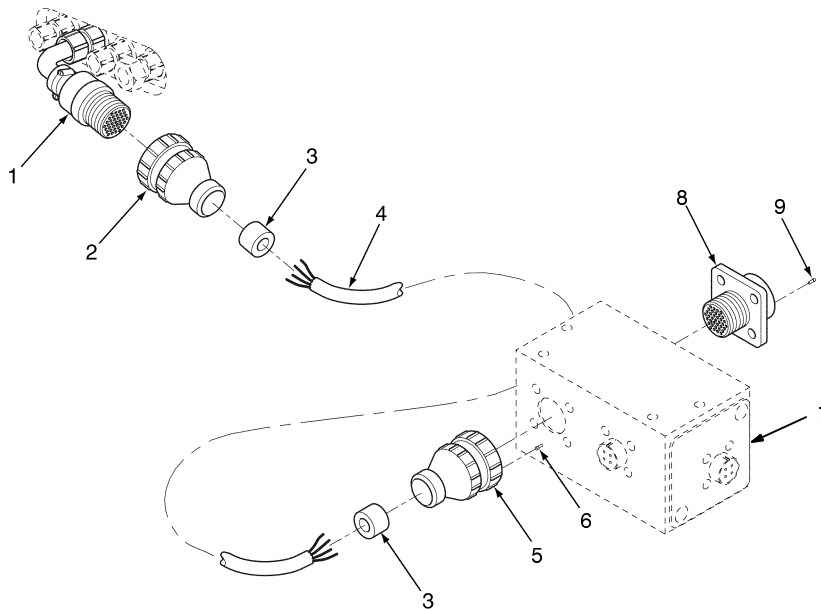


ITW0043

Figure 8-2. Reset Switch And Cable

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
186 366 Figure 8-2. Reset Switch And Cable				
1		186 327	CONNECTOR, 1/2" Strain Relief	1
2		186 378	CABLE, Shielded Power 20/4 AWG	20'
3	SW1	186 379	SWITCH, Pushbutton	1
4		186 381	PLATE, Legend	1
5		186 380	ENCLOSURE, Pushbutton	1
6		186 386	PIN, Female	4
7		186 383	RECEPTACLE, Reverse Sex Flange	1
8		186 385	PIN, Male	4
9		186 382	PLUG, Reverse Sex	1
10		186 384	CLAMP, Cable	1

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

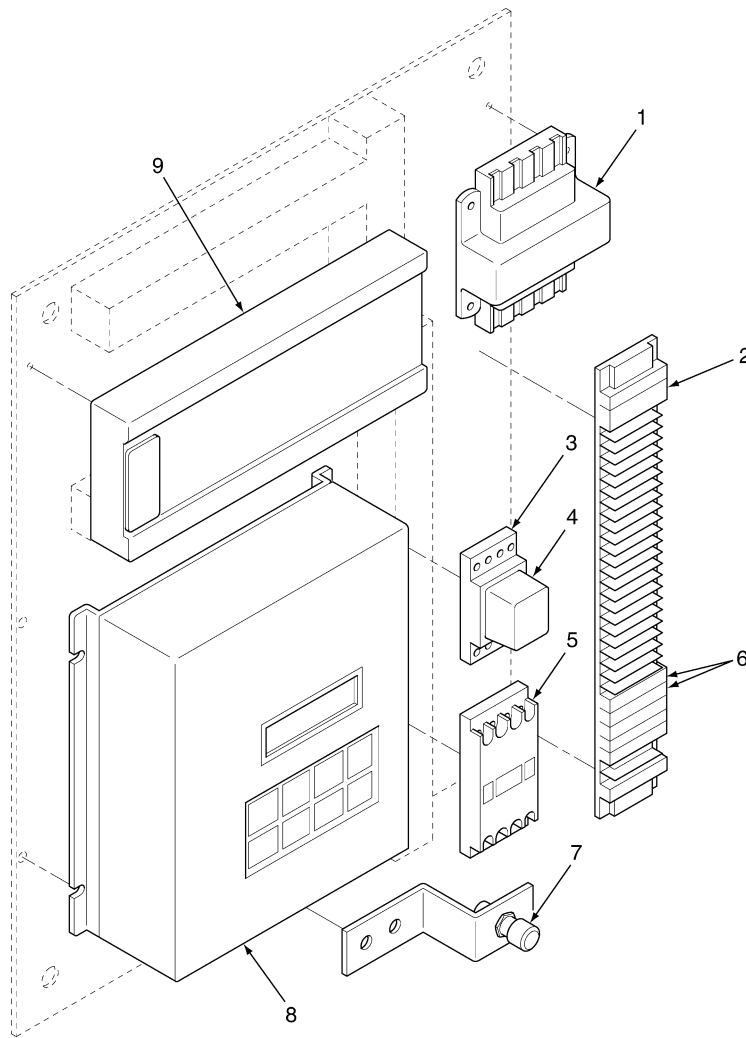


ITW0044

Figure 8-3. Cable, PLC Input/Output

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 8-3. Cable, PLC Input/Output				
1		089 348	RECEPTACLE, Reverse Sex, Free Hanging	1
		186 367	CABLE, PLC Input/Output (consisting of)	1
2		089 059	PLUG, Standard Sex	1
3		089 062	CLAMP, Cable, Standard Size	3
4		186 369	CABLE	20'
5		089 317	PLUG, Reverse Sex	1
6		079 535	PIN, Male	46
7		186 442	BOX, Receptacle	1
8		089 060	RECEPTACLE, Standard Sex Flange (part of 186 442)	1
9		079 534	PIN, Female (part of 186 442)	46

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.



ITW0045

Figure 8-4. PLC Control Panel

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
186 368 Figure 8-4. PLC Control Panel				
... 1	...	186 838	.. TRANSFORMER, Control 230/460/120Vac 60Va	1
... 2	...	189 338	.. FUSE, 1Amp 250Vac	1
... 3	...	189 336	.. BASE, Mini-Relay	1
... 4	...	189 355	.. RELAY, Mini 4 Pdt 120Vac Coil	1
... 5	...	189 335	.. CONTACTOR, 120Vac Coil	1
... 6	...	189 339	.. FUSE, 0.5Amp 600Vac	2
... 7	...	186 844	.. SWITCH, Mini-Pushbutton	1
... 8	...	186 375	.. DRIVE, Micro AC Inverter (3Hp, 460Vac, 3Ph)	1
... 9	...	189 334	.. PLC, Micrologix 1000	1

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Notes

Notes



Effective January 1, 1998
(Equipment with a serial number preface of "KJ" or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. **THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.**

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original retail purchaser, or one year after the equipment is sent to a North American distributor or eighteen months after the equipment is sent to an International distributor.

1. 5 Years Parts – 3 Years Labor
 - * Original main power rectifiers
 - * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
 - * Transformer/Rectifier Power Sources
 - * Plasma Arc Cutting Power Sources
 - * Semi-Automatic and Automatic Wire Feeders
 - * Inverter Power Supplies
 - * Intelligig
 - * Engine Driven Welding Generators
(NOTE: Engines are warranted separately by the engine manufacturer.)
3. 1 Year — Parts and Labor
 - * Motor Driven Guns (w/exception of Spoolmate 185)
 - * Process Controllers
 - * Positioners and Controllers
 - * Automatic Motion Devices
 - * Robots
 - * IHPS Power Sources
 - * Water Coolant Systems
 - * HF Units
 - * Grids
 - * Spot Welders
 - * Load Banks
 - * SDX Transformers
 - * Miller Cyclomatic Equipment
 - * Running Gear/Trailers
 - * Plasma Cutting Torches (except APT, ZIPCUT & PLAZCUT Models)
 - * Deutz Engines (outside North America)
 - * Field Options
(NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts and Labor
 - * MIG Guns/TIG Torches

- * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
- * Remote Controls
- * Accessory Kits
- * Replacement Parts (No labor)
- * Spoolmate 185

Miller's True Blue® Limited Warranty shall not apply to:

1. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
2. Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.

Warranty Questions?

Call
1-800-4-A-MILLER
for your local
Miller distributor.





Owner's Record

Please complete and retain with your personal records.

Model Name

Serial/Style Number

Purchase Date

(Date which equipment was delivered to original customer.)

Distributor

Address

City

State

Zip



Resources Available

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:

To locate distributor nearest you call
1-800-4-A-Miller

Welding Supplies and Consumables

Options and Accessories

Personal Safety Equipment

Service and Repair

Replacement Parts

Training (Schools, Videos, Books)

Technical Manuals (Servicing Information
and Parts)

Circuit Diagrams

Welding Process Handbooks

Contact the Delivering Carrier for:

For assistance in filing or settling claims,
contact your distributor and/or equipment
manufacturer's Transportation Department.

File a claim for loss or damage during
shipment.

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